JULY 1958

FOUNDRY

A FENTON PUBLICATION

✔ **Methods of Eliminating Hot Tears**

Description of varied steps taken to avoid this difficulty—**Page 82**

✔ **How To Set Production Standards**

Setting up work rates for pouring, shifting, and shakeout—**Page 85**

✔ **Producing Gray Iron Brake Drums**

Rubber diaphragm molding machines produce brake drum molds—**Page 90**

✔ **Importance of Clay Particle Size**

A look at effect of clay particle size on sand properties—**Page 94**

—Page 72

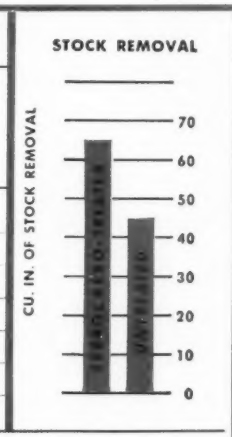
PROVED BY INDEPENDENT LABORATORY TESTS:

48.5% S•M•I*

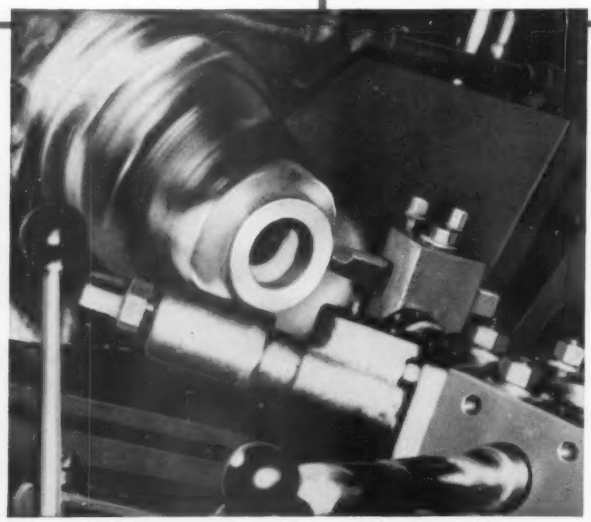
for FERROCARBO®-TREATED IRON

These impressive test results were obtained by an independent research laboratory on gray iron produced for farm equipment castings, using untreated and FERROCARBO-treated iron of identical chemistry.

Chemical Analyses	Untreated	Ferrocarbo® Treated
TC	3.51	3.54
Si	1.91	1.82
CE	4.15	4.15
Cutting speed (ft./min.)	300	300
Feed (in./rev.)	.009	.009
Depth of cut (in.)	.062	.062
Wear Land (in.)	.020	.020
Vol. of metal removed (cu. in.)	42.5	63.0
Weight of metal removed (lbs)	10.9	16.2
Percent improvement		48.5%



* Surface Machinability Improvement
Tool wear tests were conducted with a single point "Carboloy" grade 44A tool on castings machined at commercial speeds. Flank wear was measured with a 20 power microscope.



FERROCARBO Briquettes—the patented cupola additive by CARBORUNDUM®—are widely used by foundrymen to produce sound iron castings with exceptional strength, ductility and hardness properties. Tests have demonstrated that FERROCARBO-treated iron has considerably better machining properties than undeoxidized iron due to structure control and freedom from segregation. High production industries seeking to reduce costs are buying castings produced by the FERROCARBO cupola deoxidation process as an effective means for increasing production through improved casting machinability.

WRITE FOR MORE INFORMATION on how FERROCARBO produces more machinable iron regardless of metal composition. Ask for booklet A-1409, Electro Minerals Division, The Carborundum Company, Niagara Falls, N.Y.

ELECTRO MINERALS DIVISION

The CARBORUNDUM Company

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MILLER & COMPANY, CHICAGO • St. Louis • Cincinnati

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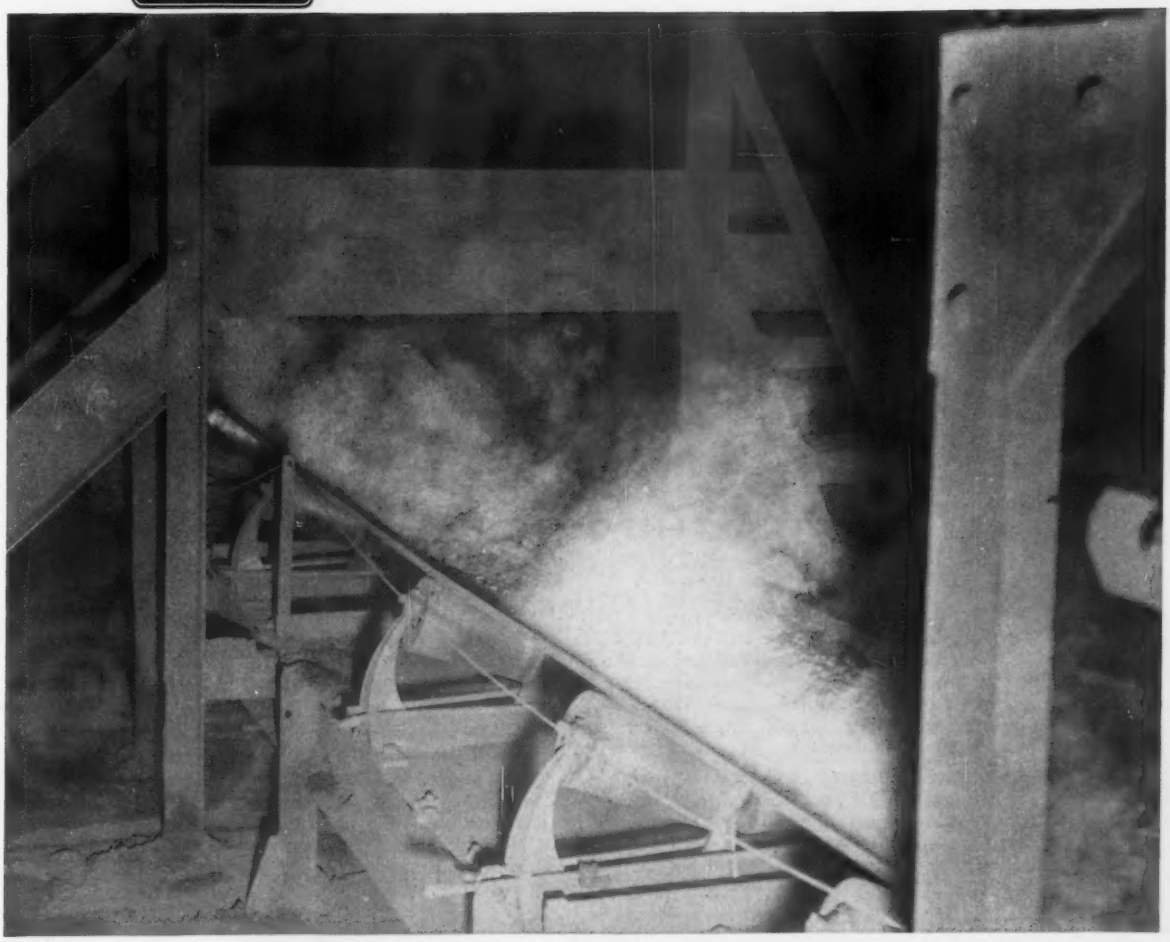
B.F.Goodrich



Hot iron clinkers burned out belt in 4½ months

B. F. Goodrich improvements in rubber brought extra savings

Problem: At this steel mill ore fines are sintered, then sent on their way to the blast furnace on a conveyor belt. But these iron clinkers are extremely hot, with rough, jagged edges. They baked the belt hard, cut into it, made it crack and break. The belt needed constant repairs, had to be replaced every 4½ months.

What was done: When a B. F. Goodrich salesman heard of the problem, he suggested a new belt, called Solarflex, specially designed by B. F. Goodrich engineers to handle hot materials. This belt is made of a special rubber that stays soft and pliable at temperatures that cause other belts to harden and crack and finally break down.

Savings: The B. F. Goodrich belt lasted 7 months—2½ months longer than previous belts. Company officials were so impressed they standardized on Solarflex belts for this conveyor system.

Extra benefits: Because the B.F.Goodrich Solarflex belt stays flexible even when exposed to high heat, it not only lasts longer than other hot-material belts, but also reduces maintenance costs because it holds fasteners better.

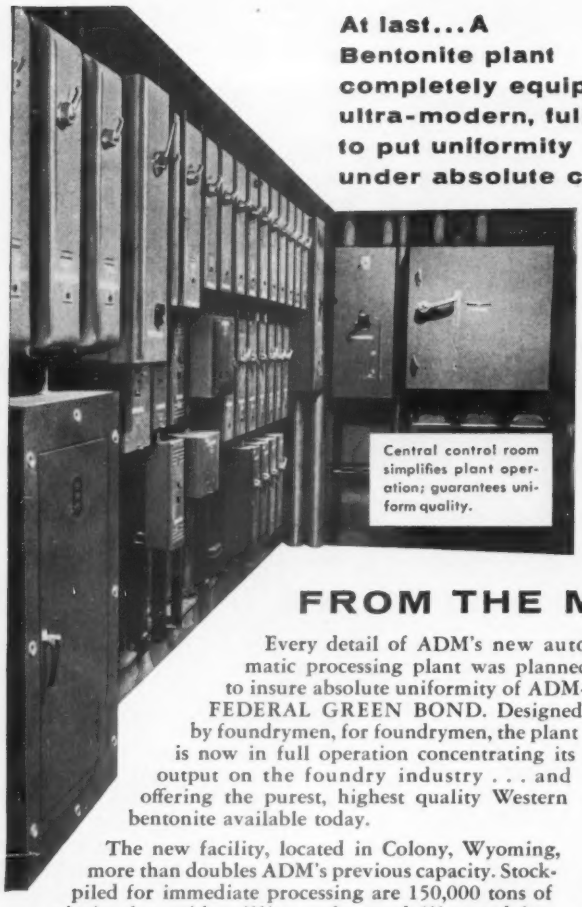
Where to buy: Your B.F.Goodrich distributor has the exact specifications on the belt that solved the problem in this steel mill. And, as a factory-trained specialist in rubber products, he *can* answer your questions about *all* the rubber products B. F. Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Dept. M-387, Akron 18, O.*

B.F.Goodrich *industrial products*

Circle 555 on Page 51

At last... A Bentonite plant completely equipped, ultra-modern, fully automatic to put uniformity under absolute control with...

"AUTOMATED" PROCESSING



Central control room simplifies plant operation; guarantees uniform quality.

FROM THE MINE TO YOUR PLANT

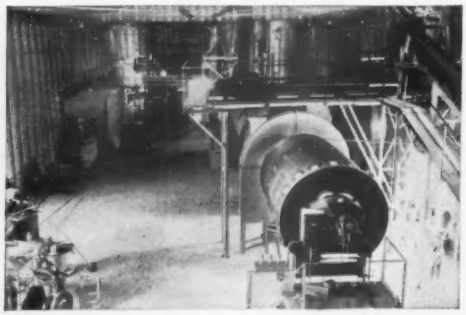
Every detail of ADM's new automatic processing plant was planned to insure absolute uniformity of ADM-FEDERAL GREEN BOND. Designed by foundrymen, for foundrymen, the plant is now in full operation concentrating its output on the foundry industry . . . and offering the purest, highest quality Western bentonite available today.

The new facility, located in Colony, Wyoming, more than doubles ADM's previous capacity. Stockpiled for immediate processing are 150,000 tons of virgin clay, with millions of tons drill-tested for purity and ready for mining.

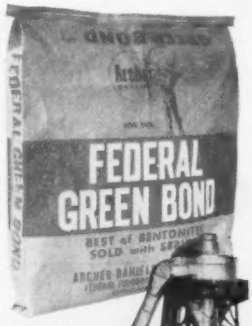
Every chance of human error has been eliminated by the latest production control devices. All measuring and weighing is done by instruments, dryer heat is electronically controlled, material is handled by the most modern pneumatic and belt conveyors, and packaging is completely automatic.

These are a few reasons why ADM-FEDERAL GREEN BOND Bentonite will provide more casting benefits per dollar than any binder of its kind.

The Colony operation is further evidence of ADM's determination to provide the foundry industry with intelligent solutions to their casting problems. Talk to an ADM field service representative today and you'll see these attitudes reflected. Why not visit our new plant soon?

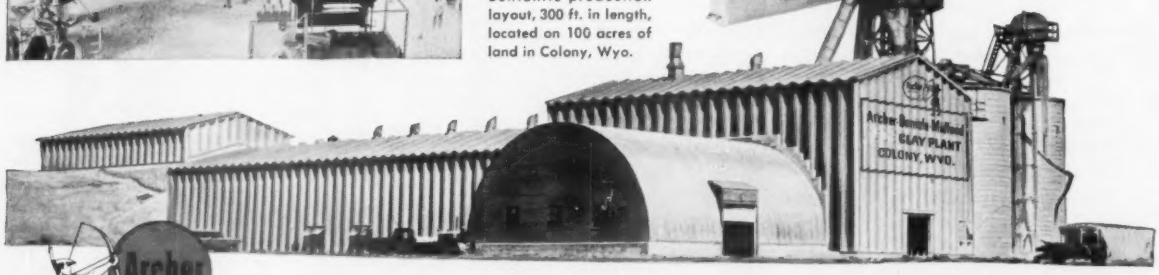


Interior of processing plant illustrates in-line arrangement of equipment. Dryer is shown in foreground.



The new bag design for ADM-FEDERAL GREEN BOND Bentonite is now labeled with the familiar Archer trademark, your guarantee of quality.*

**Two first-place awards in the American Oil Chemists Society's Smalley Check Sample Competition have been won by ADM Control Laboratories.*



Archer-Daniels-Midland, Erie Clay Plant, new Bentonite production layout, 300 ft. in length, located on 100 acres of land in Colony, Wyo.

Archer Daniels Midland company

FEDERAL FOUNDRY SUPPLY DIVISION

2191 West 110th Street • Cleveland 2, Ohio

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FOUNDRY

A PENTON PUBLICATION

July 1958

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CONVENTION SYMBOL OF A SEARCHING MIND .....

HATS OFF to the vast crowd who searched the 62nd Castings Congress for ways to produce better castings! We are hopeful that those who visited the ADM-FEDERAL display took away more than the jaunty Archer cap you see in evidence on these pages. The cap was only a festive way of expressing the more serious thought, "aiming toward better castings."

The array of new products seen in the ADM-FEDERAL booth is the means to that end. As an example, hundreds of visitors took a field trip to the ADM plant to see a preview demonstration of ADMIREZ GS-300, a revolutionary gas-setting binder promising unheard-of speed, accuracy, and economy. LIN-O-SET A-200, an entirely new air-setting binder, was successfully kicked off at the convention. Three new refractory washes for use on shell, CO_2, air-set, or oil bonded cores were introduced: ZIRCON WASH #973, CERAMIC WASH #974, and SIL-PLAST #995.

We trust that the intense interest shown in these products is evidence to *all* searching minds that the Archer offers practical answers to faster core and mold production at lower cost. Check your interests on this coupon and mail it to Archer-Daniels-Midland.

And remember, all Archer trademarked supplies are *sold with service!*

Archer Daniels Midland company

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I'm interested in more details about:

- ☐ ADMIREZ GS-300 Gas-Setting Foundry Resin
- ☐ ADCOSIL CO_2 Binders
- ☐ CROWN HILL Sea Coal
- ☐ LIN-O-SET A-200 New Air-Setting Binder
- ☐ LINOIL Core Oils
- ☐ ADM-FEDERAL Facing Compounds
- ☐ ADM-FEDERAL Core & Mold Washes, Zircon No. 973, Ceramic No. 974, and Sil-Plast No. 995
- ☐ GREEN BOND Bentonites
- ☐ FREFLO Parting Compounds
- ☐ ADM-FEDERAL Sand Stabilizers
- ☐ ADM-FEDERAL Foundry Supplies

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Company: _____

Address: _____

City: _____ Zone: _____ State: _____

Circle 556 on Page 51

Hunter, hunted and hunting

Every important objective requires careful planning, careful "stalking"—whether it be for food, or for the flawless casting of precision parts for the aviation industry. To assure the quality of your product, and guarantee its dependability . . . do your stalking for those minute, but money-wasting flaws with Ansco industrial x-ray films. Ansco's superb Superay films can separate the most subtle tonal values to help your reading and discover trouble easily, quickly.

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Superay "A"
for general inspection

Superay "B"
for critical inspection

Superay "C"
for production line work

Ansco

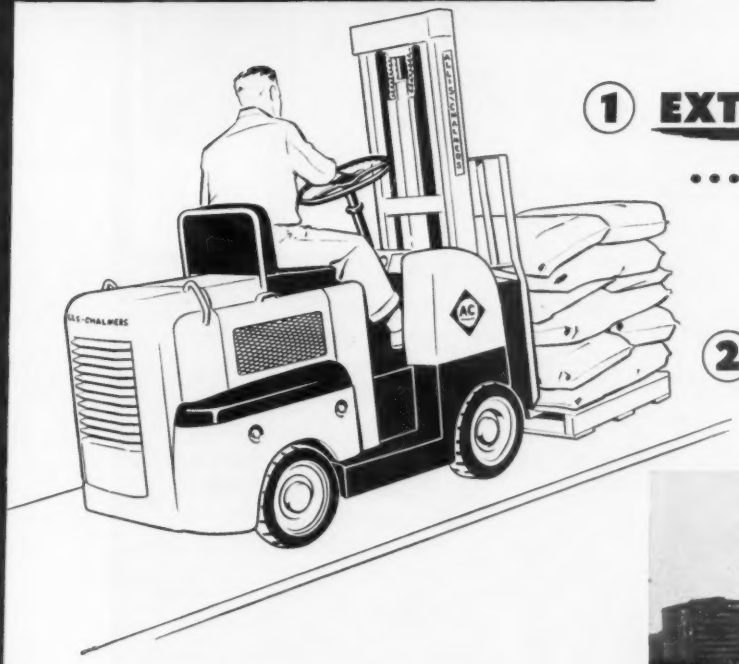
Industrial X-ray

Circle 557 on Page 51

New TWO-SPEED POWER SHIFT

TORQUE CONVERTER DRIVE

Gives you Both...



① EXTRA PULL for soft ground ...and steep climbs

PLUS

② NORMAL FAST TRAVEL when you need it

THE new Allis-Chalmers two-speed POWER SHIFT torque converter drive has a low speed range to provide the extra power for steep climbs or tough going. The high-speed range offers normal fast travel for high-production material handling. This adaptability to varying conditions adds greatly to daily output.

Just as two speed ranges help you balance power and speed, POWER SHIFT lets you quickly change forward and reverse direction *smoothly*, without jerking. You maneuver with new production-boosting ease. An inching pedal permits you to creep — even come to a full stop — yet you have full engine power for fast lifting.

Ask your Allis-Chalmers material handling dealer to show you how two-speed POWER SHIFT gives production a double boost. Write for new bulletin, today! Allis-Chalmers, Milwaukee 1, Wisconsin.

BH-64A

Circle 558 on Page 51

ALLIS-CHALMERS

YOU'RE AHEAD WITH ALLIS-CHALMERS DESIGN

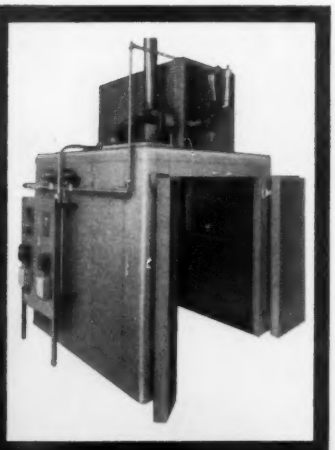
Allis-Chalmers lift trucks were the first with torque converter drive, now offer two-speed POWER SHIFT—typical of Allis-Chalmers "Years-Ahead" design.

Foundry Products and Production Rates Dictate Oven Requirements

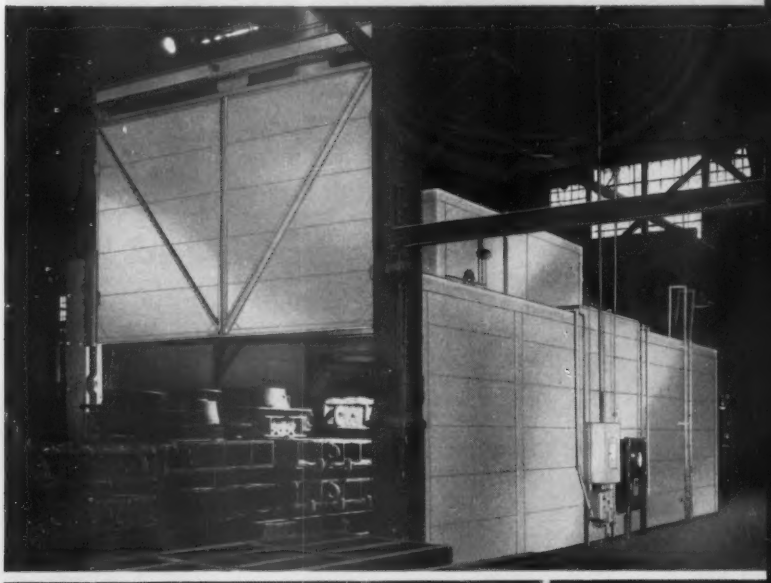
LANLY *can meet any and all of yours*

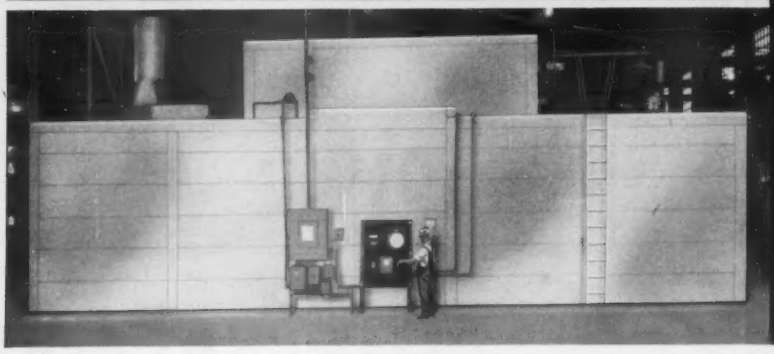
- from Small RACK TYPE OVENS

generally used when the baking of smaller cores is required in the production operation of your foundry.



-to Gigantic CAR TYPE OVENS





when the drying of large molds and cores for bigger castings is required.

This huge installation in the foundry of a large supplier of railroad products efficiently and economically carries its share of the load in the production of better castings.

Consult LANLY for a proposal on foundry ovens before you buy. A check of your present equipment may disclose a fuel eater, a core spoiler or a heat loser amongst them.

WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION

THE Lanly CO.

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Circle 559 on Page 51

A 3M Case History Report

CONTOUR POLISHING

DEBURRING-POLISHING TIME CUT 40% WITH "PG" WHEELS

MANUFACTURER: LeTourneau-Westinghouse Company

ADDRESS: Peoria, Illinois

PRODUCT MANUFACTURED: Earth Moving Equipment

3M ABRASIVE USED: "PG" Wheels

HOW 3M ABRASIVES ARE USED: "PG" Wheels used for contour polishing of air brake backing plate. Malleable cast-iron plate requires super-smooth finish on two concentric rings, to provide air-tight seal against neoprene air diaphragm.

OPERATIONAL DATA ON 3M METHOD: Two 1" x 10" "PG" Wheels, Grit #150 Three-M-ite Resinbond Cloth, mounted side-by-side on shop-made polishing shaft uniformly deburr and polish plate ring surfaces in 2-3 minutes.

OPERATIONAL DATA ON PREVIOUS METHOD: Overall deburring and polishing was by hand-rubbing with emery cloth. Time required was 4-6 minutes per plate.

PROVEN ADVANTAGES OF 3M METHOD: "PG" Wheel method, as opposed to hand finishing, allows more uniform finishing as abrading pressure can be more constantly applied with machine. Average time saving of 40% realized.

WANT MORE INFORMATION? Send for free manual, "Modern metal finishing with 3M 'PG' Wheels." Write to 3M Co., St. Paul 6, Minn., Dept. CN-78.

"PG" Wheels are manufactured in U.S.A. by 3M Company, St. Paul 6, Minn. Export: 99 Park Avenue, New York. Canada: London, Ontario

3M Coated Abrasives

"PG" WHEELS

MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

Circle 560 on Page 51

■ Imperial Belts give better service and longer life in foundry installations because of these exclusive features:

1. High Heat Resistance—Durable fabric base plies protected by special covers proved in service to give maximum resistance to damage by high temperatures.

2. INNERLOCKED* Stitching—A process developed by Imperial which positively prevents ply separation, regardless of wear.

3. Special Impregnating Compounds—Chemical treatments which add toughness, flexibility, additional heat resistance and similar characteristics necessary to long life.

Put these features to work for you to reduce your hot belt costs. Imperial Belts for foundry service are manufactured in three brands to meet temperature requirements from 300° to 600° F. Mail coupon today for complete information.

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Mail this coupon for NEW Belting Catalog and Engineering Handbook.

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Circle 561 on Page 51

With the Editors

CONVENTION Impressions: After attending 20 foundry shows staged under the auspices of the American Foundrymen's Society, and, in addition, covering nonexhibit conventions of the society, I am more than ever impressed with the three-ring circus resemblance of the modern industrial show for the foundry industry.

—o—

Basically the Same: In every convention we have technical sessions covering a wide variety of subjects. However, the basic subjects seem to remain about the same. For example, each convention for the past quarter century has considered the subjects of sand, molding, melting, gating, risering, heat treating, and others in the fields of light metals, brass and bronze, gray iron, malleable iron, and steel. Of course, the discussions are more technical and some are beyond the understanding of many foundrymen, as for example some of those presented at the heat transfer sessions, but the main subjects for consideration remain much the same. I have been interested in the progress of the fundamental papers sessions, which provide a forum for some rather long-haired but important presentations.

—o—

More Colorful: The exhibits in the modern show are more colorful than those of 25 or 30 years ago. More money is invested in displays, and the talents of those engaged in the production of displays for industrial shows have brought great changes in the appearance of the exhibition halls. But beautiful displays do not appear to be the answer to attracting attention. Every year when an exhibit is staged, I am impressed with the fact that operating exhibits attract the crowds. Foundrymen want to see machines in action, as is shown in illustrations on pp. 78-81.

—o—

Looking Back: While the modern foundry show is most interesting and attractive, I feel that the 1930 foundry show held in Cleveland probably reached the peak in real foundry interest. A temporary building on the Mall offered facilities for a number of equipment manufacturers to combine to provide a real operating production foundry. Iron was melted in an electric furnace, molds were made and placed on a conveyor unit, poured, shaken out and the castings cleaned. Nothing before or since has equalled this stupendous display effort.

—o—

Beauty: Perhaps you missed seeing Mrs. America, Mrs. William G. Giesse, Mayfield Heights, Ohio, at the foundry show. She is pictured

here being shown induction heating equipment by Dr. H. B. Osborn at the booth of Ohio Crankshaft Co.

—o—

Highly Satisfactory: But back to the 1958 show. Exhibitors appeared to be happy with the results. Some last-minute cancellations did not detract from the completeness of the show, and the fact that the boss did not bring as many of his men provided no criticism. Much interest and a good amount of buying was reported. The exhibitors appeared well satisfied with the interest displayed by those attending.

—o—

Good Job: George Mott and Herb Weber, the boys who did the spade work on the convention daily, are to be congratulated on a good job produced under difficult circumstances.

—o—

No Hurry: I have been watching the erection of all Cleveland shows beginning with 1923, and there have been eight of them. This was the slowest to take shape. Generally the exhibits of large equipment have been in place ten days or two weeks before opening. This year, much of the equipment arrived less than a week before opening. But the pieces fell into place, and the exhibition was quite complete when the doors of Public Audi-

Ladle linings last longer with H-W **BLACK PATCH**

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Costs are reduced, linings last longer and cleaner metal is assured with Harbison-Walker BLACK PATCH because:

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- H-W Black Patch develops a strong ceramic set upon heating and is exceedingly resistant to erosion.
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- H-W Black Patch is highly resistant to thermal shock and oxidation.
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Other important applications in which H-W BLACK PATCH renders unusual service for cupola requirements are breast walls, tap and slag holes, spouts and runners.

World's Most Complete Refractories Service

HARBISON-WALKER REFRACTORIES COMPANY
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Circle 562 on Page 51

Engineered for longer crucible life!

■ In the Oil Fuel models, as shown, the special higher-pressure mechanical atomizing oil spray—a Hausfeld exclusive – produces a clear, hot flame with minimum cutting action . . . *increases* crucible and lining life.

■ Well insulated lining assures uniform heat dispersal – cuts heat loss and assures many years of fast, efficient melting of brass and bronze.

With crucible sizes from #10 to #400 . . . capacities 30 lbs. to 1200 lbs. brass and bronze (copper alloys) there is a Hausfeld Stationary Crucible Furnace to meet your non-ferrous melting needs. Write today for Bulletin #102. The Campbell-Hausfeld Co., 300 Moore St., Harrison, Ohio.

interchangeable for OIL or GAS FUEL

Hausfeld STATIONARY CRUCIBLE FURNACES

CAMPBELL-HAUSFELD
METAL MELTING FURNACES

torium were opened Monday morning, May 19. Congratulations are due Bill Davis, exhibition manager, and his able staff.

—o—

Housing: Four years ago I called attention to complaints of foundrymen over the hotel situation in Cleveland. The same sort of criticism was heard again this year. Members of the society were housed in rooms which they felt were not suitable for convention visitors. Until the hotel situation in Cleveland is improved, the city will continue to be the target of unfavorable comments over quarters assigned by the housing bureau.

—o—

Magic: At least two speakers used sleight of hand to grab audience interest. Both Charles A. Hanson, Deere & Co., Moline, Ill., speaking on "An Approach to Work Simplification" at the Industrial Engineering session, and R. Monsalvatge, Dayton, Ohio, talking on "Getting the Most out of Yourself," proved their ability in the field of legerdemain.

—o—

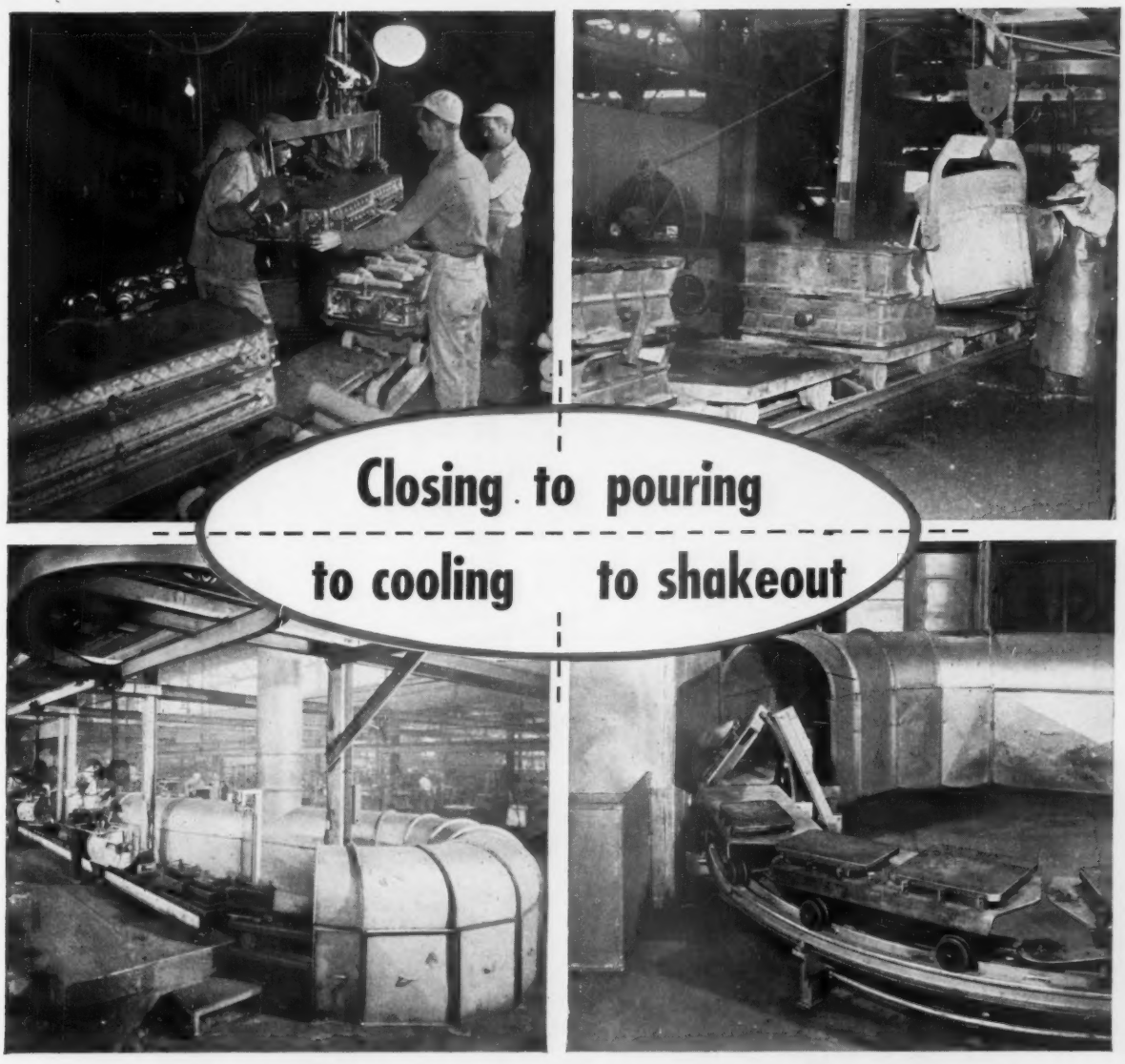
Never Completed: All in all, it was a good convention and show. I enjoyed seeing the progress of the industry and the many old friends. My only regret was the lack of sufficient time to take in every detail of the exhibit, to meet more of the old friends, to broaden acquaintanceship among the newcomers in the industry, and to partake of the special features of the program. The week was too short to do everything I had in mind. But it has been just that way with every convention and every show that I have attended.

—o—

To Publish Index: Articles appearing in FOUNDRY and about 500 other periodicals are indexed by the library of the U. S. Naval Research Laboratory. The original index cards are now to be reproduced in book form by Micro-Photography Co., 97 Oliver St., Boston 10.

—o—

St. John Book: The opening day of the convention was the publication day for our new book *Brass and Bronze Foundry Practice* by Harry M. St. John. Interest developed in the text of the book when it was published serially in FOUNDRY indicates that it will be of considerable service to foundrymen in the copper-base alloy field. If you are interested in seeing that the folks in your plant have a copy of this book to help solve ever pressing shop problems, write to our book department, or send in the coupon on page 207. F.G.S.



NON-STOP

with the efficiency and economies of a LINK-BELT Tru-Trac Mold Conveyor

IF pouring in your foundry is continuous, no other mold handling method can match the economies Link-Belt Tru-Trac offers you. It simplifies the mold handling operation by eliminating unnecessary steps in transferring the molds from molding machines to conveyor. Pouring and shakeout are centralized for greater efficiency. And all along the line, Tru-Trac conserves floor space . . . permits straight-line movement of molds through molding, closing, pouring, cooling and shakeout operations. Working conditions, too, are improved by cooling hoods that confine smoke and gases.

As part of its complete line of foundry equipment, Link-Belt makes conveyors for handling molds ranging in size from automotive engine valve lifters to bath tubs. For expert engineering in foundry mechanization, call your nearest Link-Belt office. Or you can get full information by writing directly for Book 2423.

LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

14,298

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

Circle 564 on Page 51

The sand in the microphoto above speaks quality. It's pure and fine, with the excellent rounded grain properties so desired for foundry use. This is indeed a superb sand —finest for foundries.

The obvious merits of quality can be yours with Wedron Silica

MINES AND MILLS IN THE
OTTAWA-WEDRON DISTRICT

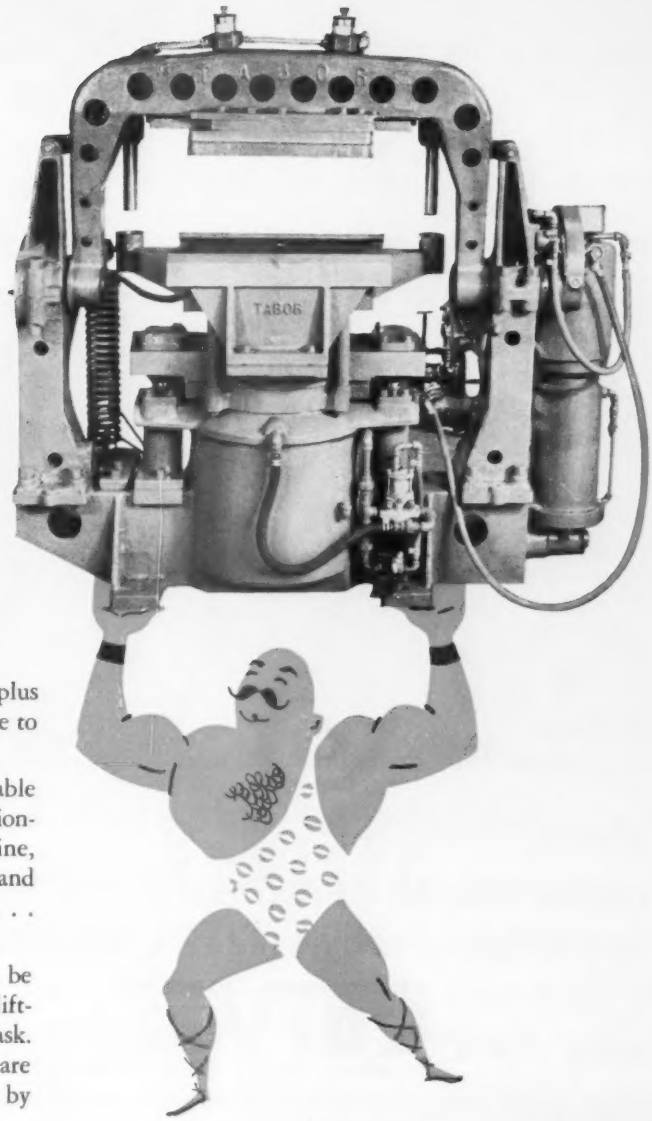
WEDRON
SILICA COMPANY
135 S. LaSalle St., Chicago 3, Ill.

99.9% PURE SILICA
WEDRON
SILICA COMPANY
INDUSTRIAL SAND

Send for illustrated brochure on Wedron sands.

Circle 565 on Page 51

it's time to look at stack molding again



With the new synthetic molding sands plus newly developed flask equipment, it's time to look at stack molding again.

Scrap losses formerly considered unavoidable can now be reduced. With the precision-designed Tabor Stack Molding Machine, there's perfect alignment between yoke and squeeze head . . . preventing mismatch . . . saving metal.

The Tabor Stack Molding Machine can be furnished with conventional lift pins or lifting frame as shown for standardized flask. Upper and lower plate heating elements are standard equipment. Jolt is operated by automatic timer.

The Tabor Man — the Technical Man — will gladly arrange for you to see the demonstration unit at our plant. Or write for data sheet.

THE TABOR MANUFACTURING CO.
Division of Turbo Machine Company
Lansdale, Pa.

THE TABOR MAN TM

TM IS A TECHNICAL MAN

TABOR

Circle 566 on Page 51

WHY PAY MORE

when you can buy the
best binder at the lowest price!

INSIST ON STEINEX

the original CO_2 Binder available

only **from Carver**

BEST QUALITY Steinex gives you absolutely the best shakeout — BY FAR!

BEST PRICE Steinex is 30% lower in cost than any other binder on the market!

BEST SERVICE Carver has the in-the-foundry experience and know-how to help you use Steinex in your CO_2 operation — successfully and profitably!

JOIN THE HUNDREDS OF FOUNDRIES THAT INSIST ON THE BEST

MAIL TODAY

CARVER FOUNDRY PRODUCTS CO.
Muscatine, Iowa

RUSH **information and prices on Steinex binders.**

NAME _____ TITLE _____

FOUNDRY _____

CITY _____ STATE _____

Calendar of MEETINGS

Sept. 10-11—American Die Casting Institute, annual meeting, Edgewater Beach Hotel, Chicago.

Sept. 15-18—Instrument Society of America, annual instrument - automation conference and exhibit, Convention Hall, Philadelphia.

Sept. 22-23—Steel Founders' Society of America, fall meeting, Homestead, Hot Springs, Va.

Sept. 22-24—Material Handling Institute Inc., joint industry fall meeting, Greenbrier, White Sulphur Springs, W. Va.

Sept. 23-26—Association of Iron & Steel Engineers, 1958 Exposition and Convention, Public Auditorium, Cleveland.

Oct. 8-10—Gray Iron Founders' Society, annual meeting, Sheraton Park Hotel, Washington.

Oct. 13-15—American Gas Association, annual convention, Convention Hall, Atlantic City, N. J.

Oct. 15-16—Michigan Regional Foundry Conference, University of Michigan, Ann Arbor, Mich.

Oct. 16-17—All-Canadian Foundry Conference, Royal Connaught Hotel, Hamilton, Ont.

Oct. 16-18—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18—New England Regional Foundry Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Oct. 18-21—Conveyor Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 27-30—Metallurgical Society of AIME, fall meeting, Cleveland.

Oct. 27-31—American Society for Metals, national metals exposition and congress, Public Auditorium, Cleveland.

Oct. 30-31—Metals Casting Conference, Purdue University, Lafayette, Ind.

Oct. 31-Nov. 1 — Northwest Regional Foundry Conference, Multnomah Hotel, Portland, Oreg.

Nov. 10-12—Steel Founders' Society of America, technical and operating conference, Carter Hotel, Cleveland.

Nov. 20-21—National Foundry Association, annual meeting, Drake Hotel, Chicago.

Dec. 3-5—American Institute of Mining, Metallurgical, & Petroleum Engineers, Electric Furnace Steel Conference, Detroit.

1959

Feb. 12-13—Wisconsin Regional Foundry Conference, Schroeder Hotel, Milwaukee.

Feb. 19-20—Southeastern Regional Foundry Conference, Hotel Tutwiler, Birmingham.

March 11-12—Foundry Educational Foundation, annual college-industry conference, Hotel Cleveland, Cleveland.

March 13-14—California Regional Foundry Conference, Huntington Hotel, Pasadena, Calif.

March 16-17—Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago.

April 13-17—AFS Castings Congress & Engineered Castings Show, Hotels Sherman and Morrison, Chicago.

May 25-26—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

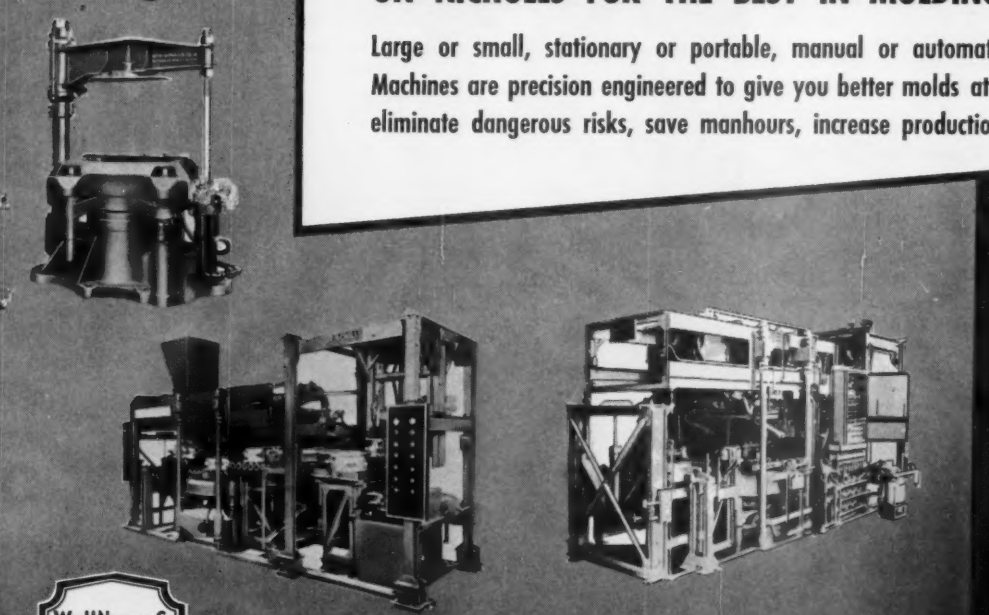
Circle 567 on Page 51

Circle 568 on Page 51→

- Accurate, uniform molds . . . true to pattern . . .
- Smooth, sensitive operation . . . dependable performance
- Long life
- Low upkeep
- Simple controls
- Push button or manual operation
- Automatic Jolt & Squeeze timing
- Permanent alignment
- Forced lubrication
- Sections heavily ribbed for added strength
- Guide pins and bushings steel hardened and ground
- Pneumatic pattern draw

FOR HALF A CENTURY MANUFACTURERS HAVE DEPENDED ON NICHOLLS FOR THE BEST IN MOLDING EQUIPMENT.

Large or small, stationary or portable, manual or automatic, Nicholls Molding Machines are precision engineered to give you better molds at lower costs . . . to eliminate dangerous risks, save manhours, increase production.



On Automatic Machines

- Air-operated car-type squeeze heads
- Built-in flask, roll-in roll-out device
- Measuring sand hopper
- Flask feed-in elevator
- Flask indexing device
- Sand spill upset
- Mold turnover and transfer

Wm. H. Nicholls Co. Incorporated Richmond Hill, L.I.N.Y. BUILT BY NICHOLLS THE SIGN OF EFFICIENCY

NICHOLLS

WM. H. NICHOLLS CO., INC. • Richmond Hill 18, L. I., N. Y.

Write, wire or phone for complete information, detailed specifications and prices.

•

VIrginia 9-0064

only COLEMAN Dielectric® CORE OVENS

are built by foundry oven experts

Coleman Dielectric Core Ovens are engineered and built to provide every essential feature for better, faster core baking — electronically. Only Coleman can give you all of the following advantages:

1 SPECIALIZED FOUNDRY OVEN EXPERIENCE

Foundry ovens are our business . . . not a sideline. Coleman Dielectric Core Ovens are the product of over half a century of specialized experience in the design and construction of ovens for every foundry need.

2 AUTOMATIC CONTROL MECHANISMS

Automatic Load-Monitor controls conveyor operation . . . permits baking a greater variety of cores without constant adjustments . . . prevents shut-downs due to overloading. Automatic Grid Control adjusts power tube to varying loads. Recycle overload system automatically restores oven to operation after momentary overload, shuts down oven if unsafe condition persists.

3 COMPLETELY SAFETY ENGINEERED

All components are protected by locked doors and safety interlock system that instantly shuts off high voltage circuit when any door is opened.

4 SIMPLIFIED PUSHBUTTON CONTROLS

Motorized electrode, conveyor and power controls located on convenient, centralized panel. Electric meter indicates electrode height in inches.

5 FULLY ENCLOSED UNIT CONSTRUCTION

Oven, power generator and conveyor are combined into one compact unit for Greater Efficiency . . . Simplified Installation.

Coleman Dielectric Core Ovens are posting spectacular production records in Aluminum, Brass and Bronze, Gray Iron, Magnesium, Malleable and Steel Foundries.

For an unbiased opinion about the suitability of dielectric core baking for your foundry, consult a Coleman Oven Engineer. As builders of the world's only complete line of foundry ovens, we have no reason to recommend any but the best for your needs . . . we make them all.

WRITE FOR BULLETIN 657

• Bucyrus-Erie Company, Erie, Pa., can turn out 2000-3000 pounds of phenolic resin bonded cores per hour in their Coleman Model 75CD-6019 Dielectric Core Oven. Cores range in size from one pound to over 100 lbs.

• This Coleman Model 60CD-4814 Dielectric Core Oven serves four high speed core blowers, each filling ten plastic multi-cavity blow-in driers per minute, at The Schaible Foundry, American-Standard Plumbing and Heating Division, Cincinnati, Ohio.

A COMPLETE RANGE OF TYPES AND SIZES . . .

for every core baking and mold drying requirement:

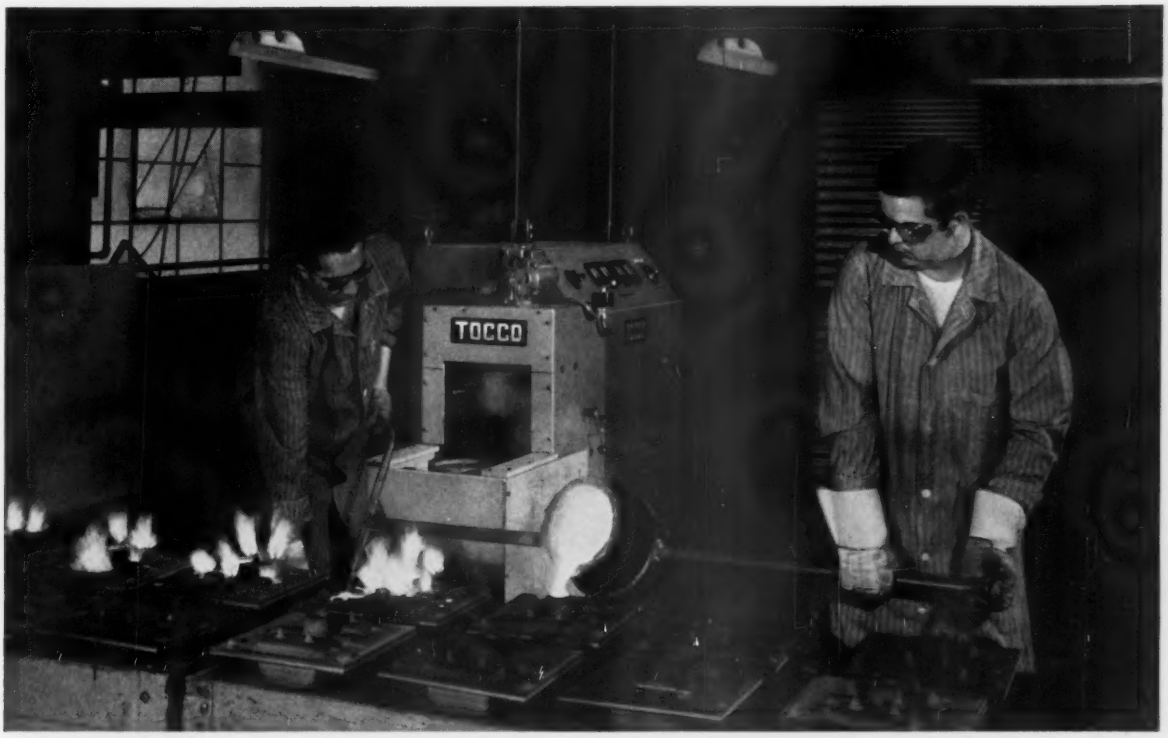
Tower Ovens • Horizontal Conveyor Ovens • Car-Type Core Ovens • Car-Type Mold Ovens • Transrack Ovens • Rolling Drawer Ovens • Portable Core Ovens • Portable Mold Dryers • Dielectric Core Ovens

THE FOUNDRY EQUIPMENT COMPANY

1821 COLUMBUS ROAD **CLEVELAND 13, OHIO**

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

MEMBER FEMA



TOCCO* Induction Heating

melts bronze aluminum and stainless steel for high-precision, porous-free castings

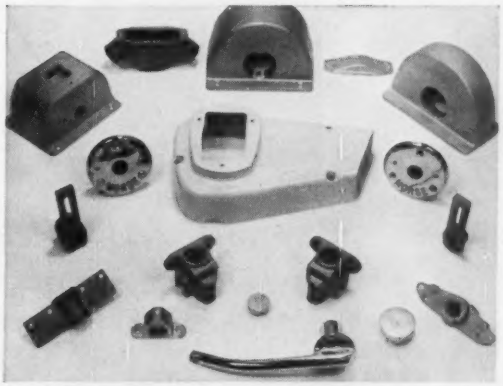
Morse Instrument Company, Hudson, Ohio, manufacturer of marine hardware and control instruments, recently switched from conventional furnaces to TOCCO Induction Melting. Results: greater speed, better working conditions and, above all, purer, sounder castings.

"Castings are free from porosity since we switched to TOCCO Induction Melting," reports president John Morse. "This is a sales advantage to us and a tremendous quality advantage for our customers."

Whether you're interested in melting ferrous or nonferrous metals, TOCCO Induction Melting offers you these important advantages:

- **Stepless Power Control**
- **Extremely Rapid Melting**
- **High Efficiency—Even on Intermittent Operation**
- **Good mixing because of Natural Agitation**
- **Extremely Low Alloy Loss**
- **No Contamination when Composition of Charges is Changed**
- **High Reproducibility of Results**
- **Minimum Space Requirements**
- **No Special Installation Charge**
- **Simple, Safe Operation**
- **Clean, Comfortable Working Conditions**
- **No Carbon Pick-up**

If any of these advantages suggest economies in your operations, write for full details—no obligation, of course.



Sample castings produced by Morse Instrument Company with new shell molding process and TOCCO Induction Melting.

THE OHIO CRANKSHAFT COMPANY

Mail Coupon Today— NEW FREE Bulletin

The Ohio Crankshaft Co. • Dept. F-7, Cleveland 5, Ohio

Please send copy of "The Case for TOCCO Induction Melting".

Name_____

Position_____

Company_____

Address_____

City_____ **Zone**____ **State**_____

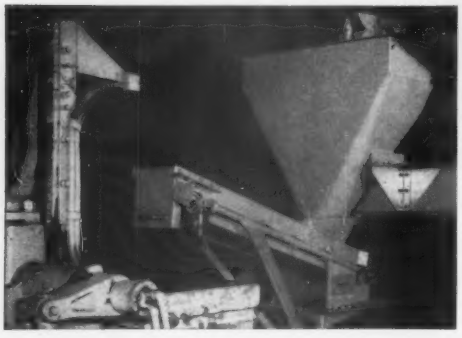
Circle 570 on Page 51

Your Sand System
is as Good as Its Weakest Part

. . . That's why successful foundries invest in NEWAYGO ENGINEERED SAND SYSTEMS and COMPONENTS. Newaygo equipment is "foundry designed" to give continuous performance day after day, month after month, under toughest foundry production conditions.

All NEWAYGO ENGINEERED EQUIPMENT, whether it is a complete system or a component part stresses rugged construction — minimum handling and maximum production.

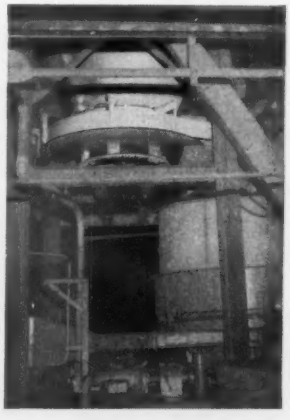
Molding Hoppers and Gates, a typical Newaygo engineered installation showing a bank of 19 overhead molders' hoppers serving cope and drag floors and squeezer molders. Emphasis is on maximum mold preparation with minimum fatigue.



Pivoting Flask Filler, a high speed, high capacity belt-type feeder Newaygo designed to receive sand from storage hoppers, plate feeders, belt conveyors or elevators. Spreads sand uniformly in large flasks on rollover machines or for floor molding.

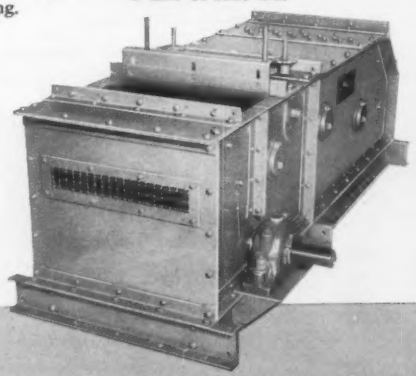
Rotary Plate Feeder

Positive volume feeder supplying a steady controlled flow of sand from 0 to over 100 tons per hour. Newaygo engineered to prevent spillage, sticking or bridging. Standard sizes 3, 6, 8 and 10-foot dia.



Aerator

A patented Newaygo design, this high speed aerator blends, tempers, cools and aerates sand more thoroughly than is possible by any other method.

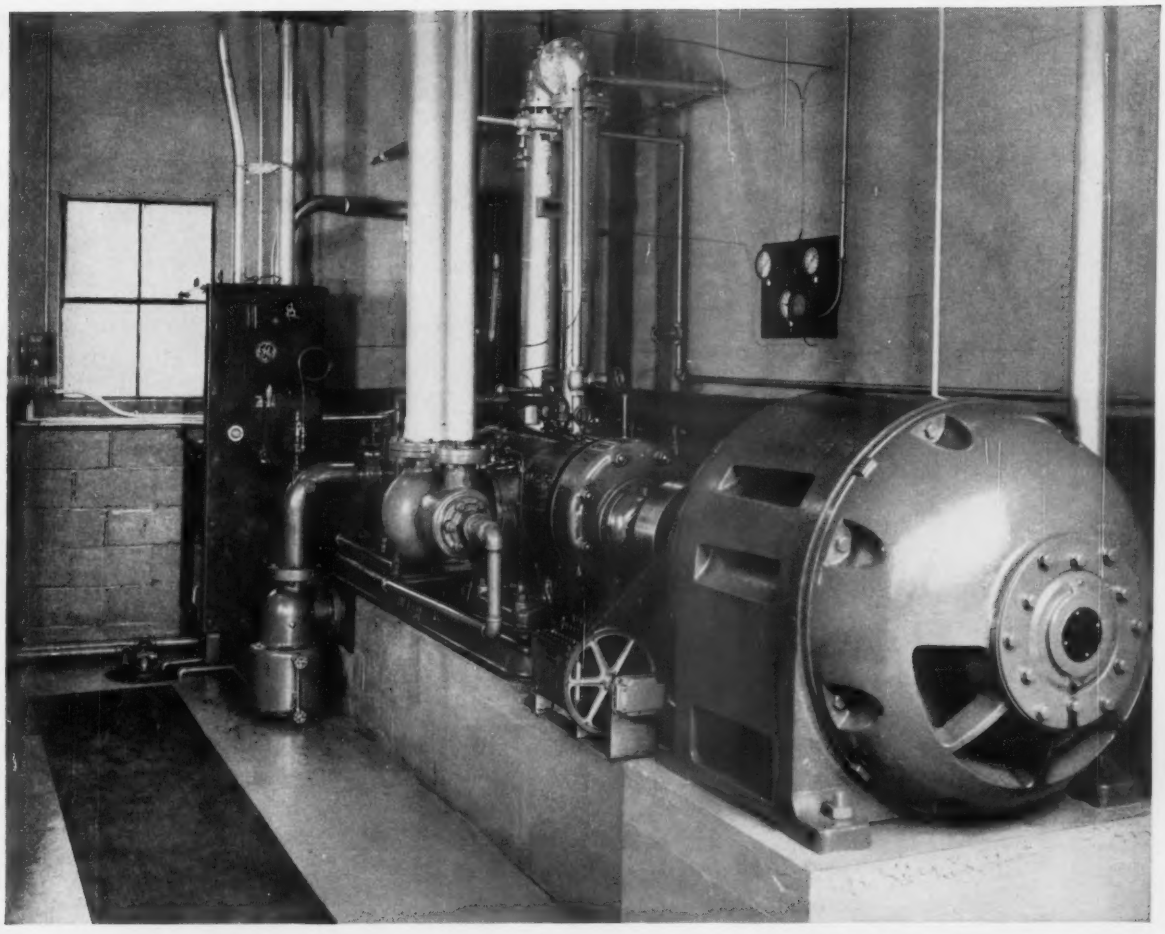


Full information and specifications on all Newaygo Foundry Equipment are contained in Bulletin No. 56. Send for your free copy.

"Foundry Business is **BIG** *Business"*

NEWAYGO engineering company
NEWAYGO, MICHIGAN

. . . and profitable too, with NEWAY® MOLD HANDLING, SAND HANDLING AND CONDITIONING EQUIPMENT



Fuller Rotary Two-Stage Compressor, C135-135H. Capacity 680 c.f.m., 100-lb. pressure, 690 r.p.m., 150 hp. motor.

16,000 HOURS OF OPERATION WITH NO MAINTENANCE

Empire Steel Castings, Inc., Reading, Pennsylvania, installed a C-135-135H Fuller Rotary Two-stage Compressor in April 1953. After 32 months—approximately 16,000 hours of operation—the compressor received a routine inspection, when a new set of blades was installed in the higher-pressure cylinder.

The Empire engineers report no downtime since replacement, although they've added 4,000 operating hours. Prior to switching to Fuller, their former experience with compressors was a different story—as many as several overhaulings in one year. With Fuller equipment furnishing a constant high capacity air supply, production costs have been greatly reduced.

Here's how Empire uses compressed air:

• In the molding department, supplying all air for pneumatic rammers, all squeeze and jolt machines, automatic set-out and lifting apparatus of mold conveyors, automatic shake-out machines, mold cleaning and spraying equipment.

• In the core department, for ramming equipment, spraying and torch drying equipment, core oven operation as well as core blowing equipment.

• In the cleaning department, pneumatic chipping hammers and grinders, blacksmith requirements, sand-blasting, pressure testing and miscellaneous tools.

• In the heat-treating department, heat treating furnace operation and cooling equipment.

To get all the facts and engineering data, write today for Bulletin C-5A.

"See Chemical Engineering Catalog for details and specifications"

C-298
3662

FULLER COMPANY
GENERAL AMERICAN
TRADE MARK

FULLER COMPANY
148 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Chicago • San Francisco • Los Angeles • Seattle • Kansas City • Birmingham

Fuller

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

Circle 572 on Page 51

REPUBLIC METALLURGICAL SERVICE

Provides a Solid Foundation for Industry's Most Complete Line of Merchant Pig Iron

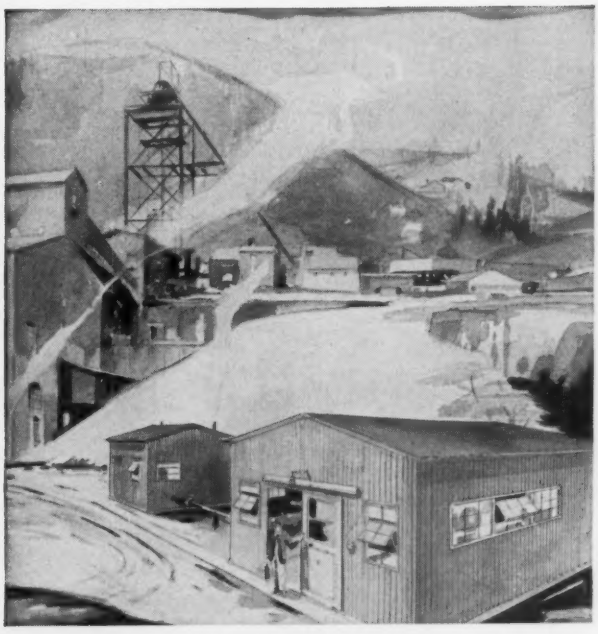
Republic provides expert metallurgical service to assist you in selection, application, and processing of the most complete line of merchant pig iron available in the industry.

The Republic Pig Iron Metallurgists are both foundrymen and skilled technicians. They know all types of irons and their characteristics. They have a solid industry background gained from years of actual foundry experience. And, they talk *your* language.

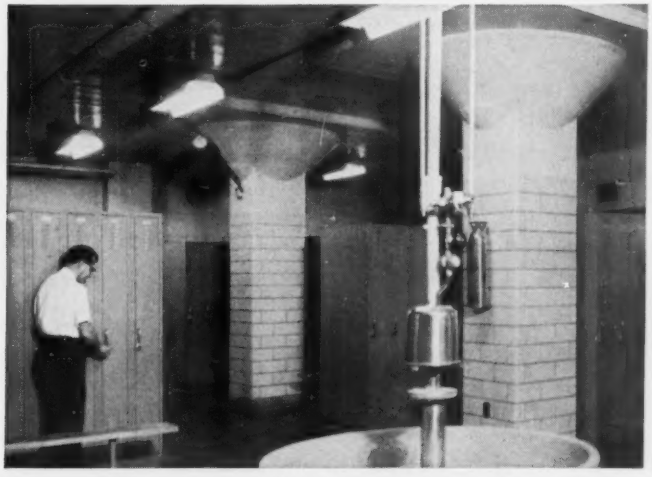
These men are frequent and welcome visitors in hundreds of foundries. They have at their fingertips information on the latest processes and techniques available for improving castings, and expanding their use and sale. Their recommendations and suggestions often result in improved operations, increased production efficiency, and output at lower unit cost.

And, backed by industry's most complete line of merchant pig iron: Chateaugay; Northern Basic, Foundry, Bessemer, and Malleable; Southern Basic and Foundry; Republic Pig Iron Metallurgists are able to recommend the proper grade for your specific job without hesitation or prejudice.

This service is available now. It is confidential. There is no obligation. Mail the coupon today if you would like a Republic Pig Iron Metallurgist to call at your foundry.



TRUSCON "BUDGET BUILDINGS" provide the economical way to meet additional space requirements. They are strong, lightweight, flexible—can be erected quickly at foundry locations. A tight galvanized coating eliminates the need for painting. Buildings are shipped as a package including all roofing, siding, windows, doors, and hardware. Widths, 32 to 48 feet (in 4′ 0″ increments) . . . heights, 12 and 14 feet . . . lengths as long as you want them. Send coupon for complete facts.



REPUBLIC HIGH STRENGTH STEEL BOXES provide the perfect solution for handling hot work in foundries. They are designed to stand plenty of use and abuse. Each box measures 53″ long x 38″ wide x 26″ deep. Corrugated steel construction of the sides and bottoms assures long service life at lowest per-year-cost. Stacking brackets are securely welded to top corners of each box permitting tiering to any practical height. Sixteen-inch clearance is provided for easy handling by fork lift truck. The coupon will bring you complete facts.

REPUBLIC STEEL LOCKERS provide on-the-job protection for employee valuables and personal belongings. They combine smart styling and design with simple construction for fast, easy installation. Republic Steel Lockers provide full inside-locker roominess, sanitation, safety. Bonderized finish is locked on . . . rust is locked out. Republic's Berger Division offers complete locker planning and installation. Send coupon for full facts.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. FO-6034
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

☐ Have a Pig Iron Metallurgist call.

Send more information on:

☐ Chateaugay Pig Iron ☐ Northern Pig Irons
☐ Southern Pig Irons ☐ Truscon "Budget Buildings"
☐ Lockers ☐ High Strength Boxes

Name_____ Title_____

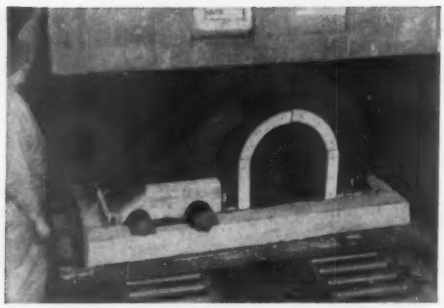
Company_____

Address_____

City_____ Zone____ State_____

Circle 573 on Page 51

After only 90 seconds of vibrating, 2500 pounds of core "come clean".



CP Core Box Vibrator frees 3000 pound cores in 90 seconds!

In just a minute-and-a-half this Core Box Vibrator frees cores weighing up to a ton-and-a-half! Core output is greatly increased and you get a perfect draw every time. Cores come out with no flaws, damaged edges, distorted sections or dimensional variations . . . there's no time wasted troweling. Needs no special adaptors . . . the built-in air clamp holds the vibrator securely to any core box cleat up to 6¼" wide. Its 9000 orbital vibrations per minute eliminate sledging . . . reduce core box maintenance to a minimum. In spite of the core size, the CP vibrator is positioned only once. Write for free demonstration on your work.

Chicago Pneumatic Tool Company,
8 East 44th St., New York 17, N. Y.

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

WHERE DO NEW IDEAS COME FROM?

Wheelabrator pioneering – a record of achievement

When our engineers perfected the mechanism for controlling the blast stream from a centrifugal wheel, the first practical airless blast unit . . . the WHEELABRATOR . . . came into being.

The phenomenal success of this revolutionary development stimulated demand for its application to many cleaning problems. This, in turn, sparked research that resulted in the development of Wheelabrator machines that were the first of their kind. To name but a few: The endless belt Tumblast, the Monorail Blast Cabinet, the Car-Type Room, the Swing Table, the Multi-Table, the Super Tumblast, and the Continuous Tumblast.

And Wheelabrator creative engineering has continued to lead the way. With a background such as this, you can expect more from Wheelabrator — where pioneering research is a continuing effort to supply industry with improved methods and equipment necessary to do a better cleaning job at lowest cost.

WHEELABRATOR
CORPORATION

505 South Byrkit Street Mishawaka, Indiana

Canadian Offices: Scarborough (Toronto) – Montreal

50
YEARS OF PROGRESS
WHERE PIONEERING LEADERSHIP INSURES PERFORMANCE

World's largest manufacturers of airless blast equipment and steel abrasives.

Circle 575 on Page 51

ANOTHER INDUCTO INSTALLATION...

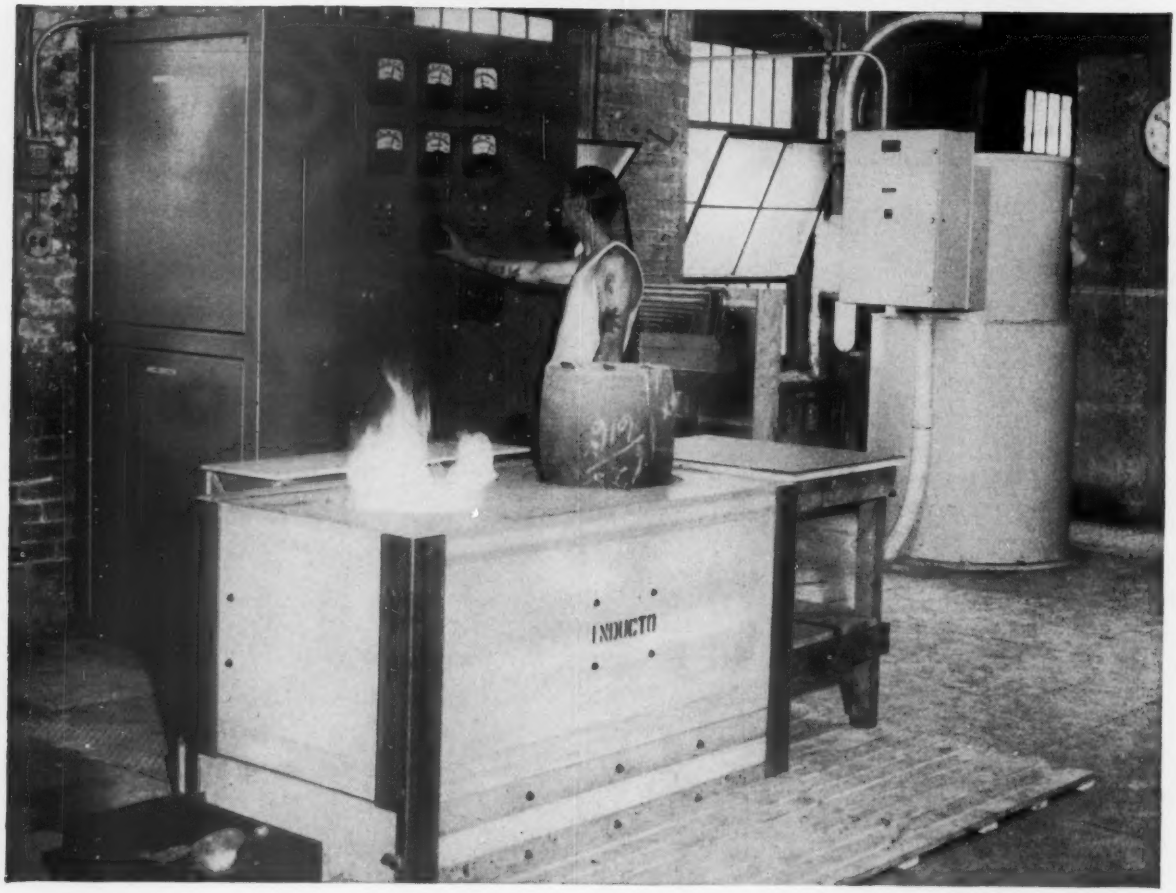


PHOTO COURTESY OF BUSHINGS, INC., PHILA. 32, PA.

The Foundry and the Feather Duster

Shortly after Bushings Incorporated, a Philadelphia manufacturer of cast bronze bushings and bearings, replaced four oil-fired furnaces with an INDUCTO Push-Out induction furnace, the management received a strange request . . . the foundrymen wanted a feather duster. They liked the INDUCTO furnace and control so much, and were so pleased with the cooler and cleaner foundry, that they wanted a feather duster to keep the equipment clean.

And the management was pleased too! For in addition to happier and more productive employees, they gained other benefits. The higher melting speeds and precision control of the INDUCTO Push-Out furnace helped reduce metal losses. In addition, it became possible to reclaim metal from melts and machining. Production time was saved in the handling of crucibles and the transferring of melts. In fact, the one INDUCTO Push-Out furnace provided as many melts in six hours as the four oil-fired furnaces did in eight.

Why not learn for yourself how INDUCTO furnaces and precision control can help modernize your foundry and save production dollars? Write today for more complete details.

INDUCTOTHERM corporation

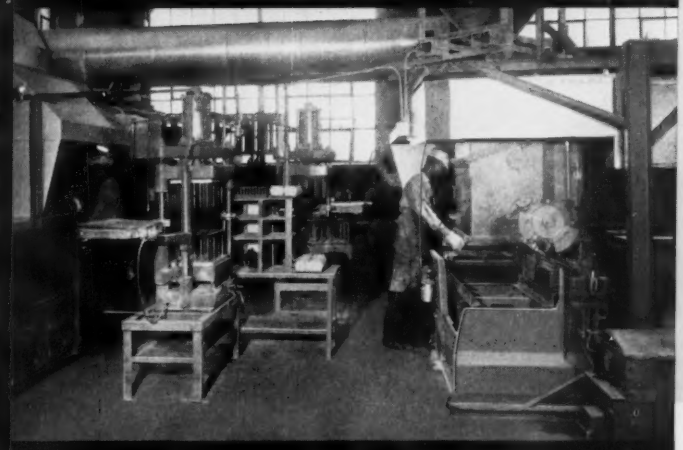
412 Illinois Ave. Delanco, N. J.

Circle 576 on Page 51

COMPLETE SHELL FACILITIES

at your service . . .

MOLDS—Newest production methods, latest equipment combine to produce high precision, low cost shells on quantity basis.



CORES—Automatic, economical CO_2 shell core-making facilities round out an efficient "mold-a-minute" precision production team.

CASTINGS—Close tolerance, smooth finish, non-ferrous shell-type castings are poured from metal melted in high frequency induction furnaces.

For fast service, fine dimensional accuracy and low over-all cost on small and medium size non-ferrous castings, look to City Pattern Foundry & Machine Company. Here you'll find, too, all the additional facilities . . . a complete, modern pattern shop, foundry, metallurgical laboratory and machine shop . . . that are required to provide an *all inclusive* service on top quality shell process castings.

City Pattern Foundry & Machine Company's experience in the shell process dates back ten years. As a result, here are shell facilities you can count on for all your jobbing needs. We'll be delighted to discuss your needs with you in detail. Why not call or write today.

Circle 577 on Page 51

CITY PATTERN

FOUNDRY AND MACHINE CO.

1161 HARPER AVENUE • DETROIT 11, MICH.

PHONE: TRinity 4-2000

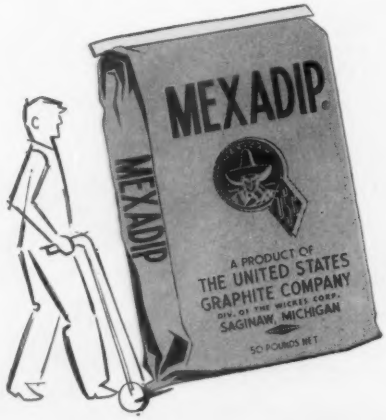
WASHES · WAS

no matter what the application . . . there is Mold Wash for every foundry need . . . or

SIPAC®

with only the addition of water, produces a bright, gold-colored coating with fine, smooth surfaces, using any foundry sand. It's non-carbonaceous and inert and will not react with any molten metal, including grey iron and steel. Resists flaking and completely protects core surfaces. You get improved casting quality. Sipac is available in 55 gallon drums, ready for mixing and dilution to desired Baume — even to a scale of 32 — without settling.

MEXICAN® VV FLAKE ("volatile vehicle")— meets the growing demand for good mold and core wash suited to carbon dioxide mold-core hardening process. Completely compatible with isopropyl alcohol, oleum spirits, kerosene or similar agents, Mexican VV Flake provides extra refractory protection . . . improves skin hardness . . . gives better casting quality. Comes in paste form, suitable for application by spraying or dipping.



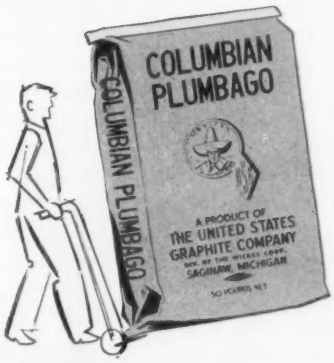
MEXADIP® — refractory core coating containing its own binder, requires only water to prepare it for use. Will not ferment, produces a very uniform, even coating over entire core with practically no sagging, running or dripping. Use it throughout foundry for green or baked cores, ferrous or nonferrous foundry practice.

THE UNITED STATES

GRAPHITAR® CARBON-GRAPHITE • **GRAMIX®** POWDERED METAL PARTS • **MEXICAN®** GRAPHITE PRODUCTS • **USG®** BRUSHES

HES · WASHES

a United States Graphite Company Core or one may be engineered to your requirement



MEXICAN® COLUMBIAN PLUMBAGO— versatile wet blacking used for loam work, green or dry sand or torch dried molds where soft coat with high resistance is required. Suitable for all types of castings, including those of over 25 tons, high steel mixtures and castings poured at high temperatures.

SLICK RITE® — compounded from a base of high quality flake graphite to produce best slicking qualities, Slick Rite is applied to green sand molds by hand rubbing, tooling or brushing. Excellent casting quality obtained when mixed with water and molasses to produce wet lead for spraying molds and cores.

MEXICAN® 172—high refractory wet blacking with binder. For application to both molds and cores of heavy sectioned castings where best possible finish is required under severe pouring conditions.

No. 866® — is a wet blacking without binder. Provides soft coating with good refractory properties for molds and cores of medium and light sectioned castings. Also makes good blacking for bell end cores in pressure pipe manufacture. Can be applied by spraying, brushing or swabbing at 40-45 Baume.

MEXICAN® 700 — is particularly suitable for large molds and dry sand cores of high carbon iron such as cast iron rolls and ingot mold castings poured at intermediate temperatures. Contains no binder.

Write today for engineering bulletin No. 17 giving complete details and application methods of core and mold washes for all ferrous and nonferrous foundries.

GF-244-2

GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

YOU'LL DO A BETTER JOB

with H. V. ADAMS DESIGNED

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

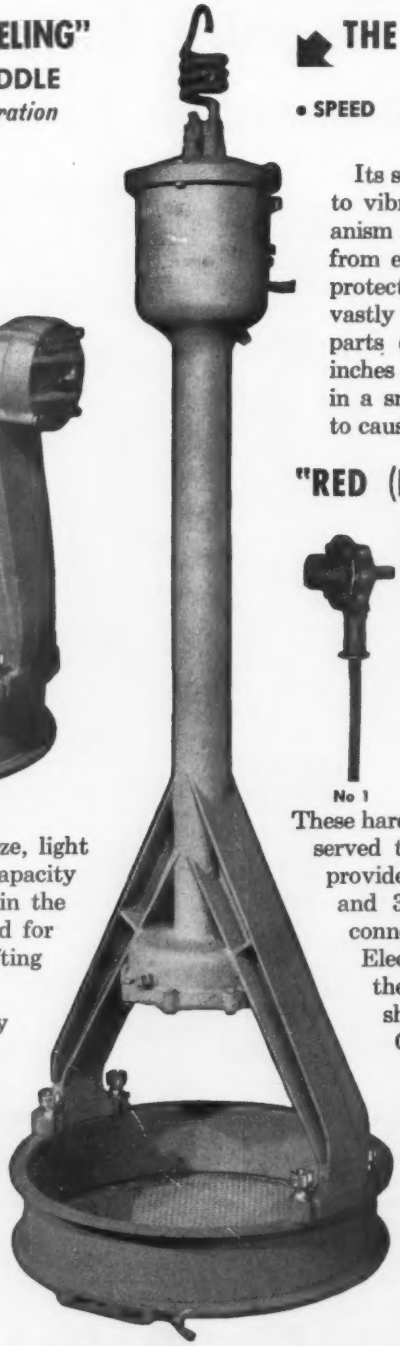
with the Double Eight Vibration

Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



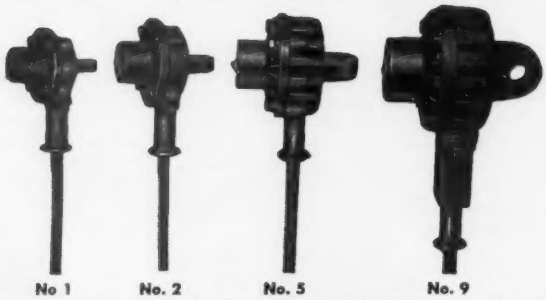
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- SPEED
- ECONOMY
- SAFETY
- LONGER LIFE
- GREATER SIFTING CAPACITY

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- No. 11 NOISELESS TYPE VIBRATOR
- A-20 ELECTRIC VIBRATOR
- RED ELECTRIC KNEE SWITCHES
- "ROTO" ADJUSTABLE BIN VIBRATOR
- 2 MIN. UNIVERSAL FINENESS TEST SIFTER.
- UNIVERSAL TRIPOD CARRIER

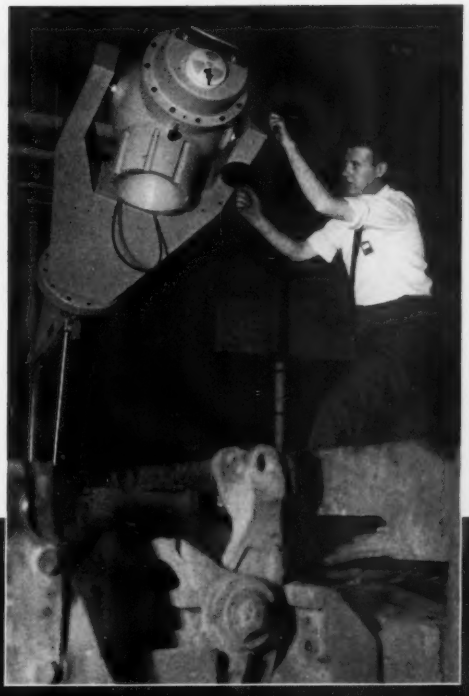
ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 Cable Address: "Rotoplane Chicago" H. V. ADAMS, Mgr.

big power for big jobs



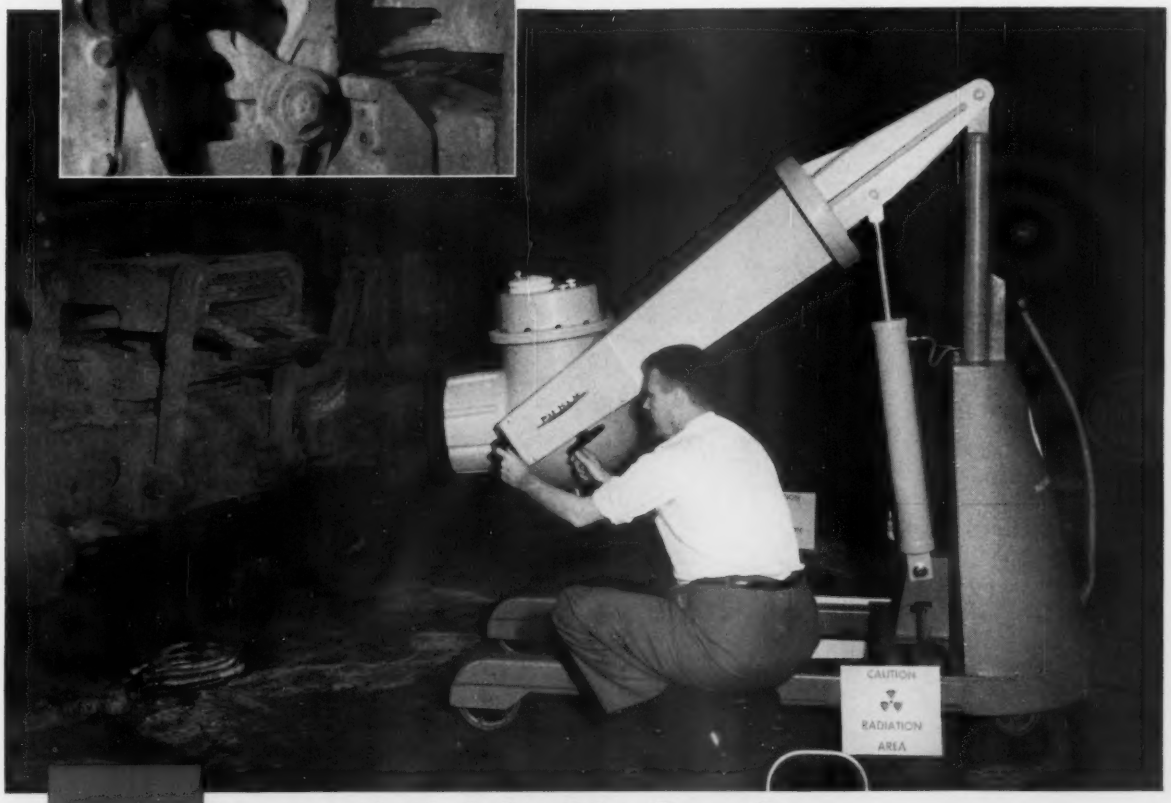
Cyclops Cobalt^{60} unit

puts 2-3,000,000 volt equivalent

x-ray on wheels

- ✔ **radiographs up to 12" thick steel**
- ✔ **costs under $20,000**
- ✔ **works anywhere**

GET THE FACTS – call any Picker District office (see local 'phone book) or write, telephone or wire Picker X-Ray Corporation, 25 South Broadway, White Plains, N. Y.



one stop for everything in industrial radiography

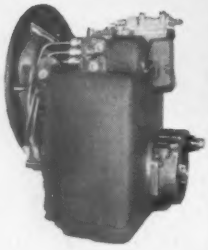
ANDREX	portable x-ray units—130 KV, 160 KV, 200 KV, 260 KV
PICKER	x-ray units—5 to 50 KV, 150 KV (stationary and mobile), 270 KV portable, 260 KV heavy-duty
TECH/OPS	units for isotope radiography—sources, equipment, containers for Iridium ^{192} Cobalt ^{60} and Thulium ^{170}
ACCESSORIES	. . . films, tanks, darkroom sundries, illuminators, *everything*

Picker x-ray

Circle 580 on Page 51

H-25 { . . . geared for penetration
. . . geared for transportation

the only COMPLETE power-shift transmission



. . . having two speed ranges forward and two in reverse — the low range for digging power and close maneuvering—the high range for fast, economical travel in either direction.

All shifting, forward or reverse, is an instant finger-tip action with no need to stop between range shifts. The torque-converter is carefully matched with the transmission and is the more costly and more efficient two-phase type that automatically becomes a thrifty fluid drive when torque multiplication is not needed. Transmission and converter also keep comfortably cool because their oil is radiator-cooled.

This new **PAYLOADER**® has more hustle than you've ever seen in a tractor-shovel. It's got everything to turn out big production all day long with the least operator effort and is the only machine in its class with *complete* power-shift transmission and power-steer. The carry capacity of 2,500 lbs. is 25% greater than has ever before been available in a tractor-shovel of its size and maneuverability, yet it easily goes in and out of boxcars with narrow 6-foot doors.

Another valuable and exclusive feature is the power-transfer differential that makes traction more effective and reliable at all times because the wheel with the better grip automatically gets the most power.

The H-25 is *full* of other plus features that mean more production, less maintenance and longer life: closed hydraulic system, wet-sleeve overhead valve engine, triple air cleaners, full-shift fuel capacity, 4,500 lbs. of bucket breakout force and 40° bucket tip-back, to mention only a few.

Your Hough Distributor wants to show you how the greater capacity, speed and handling ease of the H-25 can cut your bulk-handling costs. Ask him about Hough Purchase and Lease Plans too.

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.

Send full data on the H-25 PAYLOADER.

Name.....

Title.....

Company.....

Street.....

City..... State.....

7-A-1

SAY "HUFF"

Modern Materials Handling Equipment

THE FRANK G. HOUGH CO.

LIBERTYVILLE, ILLINOIS

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

Circle 581 on Page 51

Late News

FELLOWSHIP AWARDS: First awards have been made in the FEF-Wheelabrator fellowship program. The board of awards has selected eight men each of whom will receive a $1500 fellowship for graduate study during the coming year. Recipients are Nicholas Baloff, El Cerrito, Calif.; Richard V. Barone, Belmont, Mass.; Harry D. Bradshaw, Hampton, Va.; Charles F. Knight, Winnetka, Ill.; Paul J. Lady, Kenton, Ohio; William F. Shaw, Kohler, Wis.; Robert J. Warrick, Homer, Mich., and James R. Widmoyer, LaCrosse, Wis.

CLOSINGS: National Malleable & Steel Castings Co. plans to shut down its Indianapolis plant on July 11. Reopening will depend on business conditions but is not expected for at least a year. Hill Acme Co., Cleveland, has closed its gray iron foundry to provide space for expansion of its machine tool manufacturing.

CAR ORDERS UP: May orders for new freight cars totaled 1372, against 278 in April and 3370 a year ago. Deliveries dropped from 5163 in April to 3534 in May and backlogs shrunk further. Unfilled orders on June 1 totaled 30,386 cars, compared with 32,908 on May 1 and 97,006 a year ago.

BRITISH AUTO BOOM: Production of automotive gray iron and malleable castings in Great Britain during the first quarter was 28 per cent larger than a year ago and a record total, according to the Joint Iron Council, London. This increase offset a 12.5 per cent drop in castings output for building and domestic industries and smaller losses in other classifications to bring total production to 961,000 tons, practically unchanged from the previous quarter and the like 1957 period.

FOUNDRIES SAFER: Accident record of foundries is improving. Foundry members of the National Safety Council cut their frequency rate 11 per cent last year to an average of 9.23. The average for all industries was down 2 per cent to 6.27. Severity rate for foundries was 842, a 4 per cent cut, compared with a 1 per cent rise to 740 for all industries.

Steel foundries continue to set the best safety record among castings producers, according to Department of Labor data covering all foundries. First-quarter injury-frequency rates compared with the same 1957 period are reported as follows: Steel 13.9 vs 23.1; nonferrous 20 vs 20.9; gray iron and malleable 22.1 vs 24.2; all manufacturing 9.9 vs 11.3.

MFS OFFICERS: Malleable Founders' Society elected Richard W. Crannell, president, Lehigh Foundries Co., Easton, Pa., to the presidency at its recent annual meeting. He succeeds P. C. DeBruyne, vice president, Moline Malleable Iron Co., St. Charles, Ill. New vice president is Dudley V. Walker, managing director, Eberhard Mfg. Co. Div., Eastern Malleable Iron Co., Cleveland.

The society's Charles H. McCrea Medal was awarded to James H. Smith, general manager, Central Foundry Div., General Motors Corp., Saginaw, Mich., in recognition of his "distinguished service to the malleable iron industry."

PERSONALS: Robert Latham, iron foundry superintendent for Bethlehem Steel Co., Bethlehem, Pa., has retired. He is succeeded by D. E. Best, brass foundry superintendent . . . Eric M. Schlesinger, formerly Wisconsin manager, Black Products Co., has joined the sales staff of Milwaukee Chaplet & Supply Co. . . . Hans B. Missbach has been appointed supervisor, foundry laboratory operations, Applied Research and Development Laboratory of General Electric Co.'s foundry department . . . Muncie Malleable Foundry Co., Muncie, Ind., has appointed Albert W. Norton superintendent, George F. Elliott chief inspector, and Anthony D. Vitantonio assistant superintendent . . . Wilson P. Burns, superintendent, Sharon Works, National Malleable & Steel Castings Co., has been named manager of the company's Cleveland Works, succeeding Stewart Tame, retired. Lawrence G. Black-

mon will replace Mr. Burns at Sharon . . . William M. Jackson, recently plant manager, Indiana Foundry Corp., Muncie, Ind., has been appointed general manager.

BIDS FOR FOUNDRY: Stockholders of Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., will vote June 26 on a $7 million offer by Textron Inc. to buy the company. Two years ago Textron Inc. acquired control of Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.

ACQUIRE FOUNDRY: Bay City Foundry Co., Bay City, Mich., has been acquired by Jack Bean, Harold Schroeder, and Philip G. Smith. The first two men are former president and vice president, respectively, of Michigan-Standard Alloy Casting Co., Detroit, and Mr. Smith is president of Electric Alloy Steel Co. and Philip G. Smith Co., Lincoln Park, Mich.

PRIMARY ALUMINUM: Output of primary aluminum for the first five months this year totaled 661,069 tons, off less than 4 per cent from the 1957 period, the Aluminum Association reports. May production of 129,083 tons compares with 128,559 tons in April and 145,174 tons a year ago.

Aluminum Co. of America plans to begin production of aluminum in two new potlines at its Massena, N. Y., operations this fall, completing the first phase of a multi-million dollar modernization and expansion program there. Power will be drawn from the St. Lawrence project.

MISCELLANY: American Foundry Flask Co., Kansas City, Mo., has appointed John A. Sharritts & Co., Cleveland, its sales representative in Ohio and western Pennsylvania . . . Tamms Industries Co., Chicago, has moved into its new manufacturing and warehouse plant in suburban McCook, Ill. . . . McMinnville Castings Co. will open a plant at McMinnville, Tenn., for the production of machine tool parts. Frank C. Cobb, Memphis, Tenn., is president . . . Foundry of Greenwood Mills-Mathews Plant, Greenwood, S. C., was badly damaged by fire recently . . . April index of material handling equipment sales was 122.4, against 97.9 in March and 132.7 a year ago, according to the Material Handling Institute.

Prices of Foundry Metals and Coke

(As of June 23, 1958)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$18.00-18.50
OVEN	
Birmingham	$28.85
Buffalo	30.50
Detroit	30.50
Erie, Pa.	30.50
Indianapolis	29.75
Kearny, N. J.	29.75
Milwaukee	30.50
Montreal, Que.	31.00
Neville Island (Pittsburgh)	29.25
New England, deld.	31.55
Painesville, O.	30.50
Philadelphia	29.50
St. Louis	31.50
St. Paul	29.75
Swedeland, Pa.	29.50
Terre Haute, Ind.	29.75

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$68.50	$69.00
Birmingham	62.50	66.50
Buffalo	66.50	67.00
Chester, Pa.	67.00	67.50
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Everett, Mass.	68.00	68.50
Fontana, Calif.	75.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	68.40	68.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 27.00; tin bronze, No. 225, 36.00; No. 245, 30.75; High-leaded tin bronze, No. 305, 31.25; No. 1 yellow, No. 405, 22.75; manganese bronze, No. 421, 24.50.

ALUMINUM: 99 per cent plus primary ingots 26.10. Secondary No. 12 alloy, 21.25-21.50. Deoxidizing grades: No. 1, 22.75; No. 4, 17.25.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 25.00-26.50, delivered Connecticut valley.

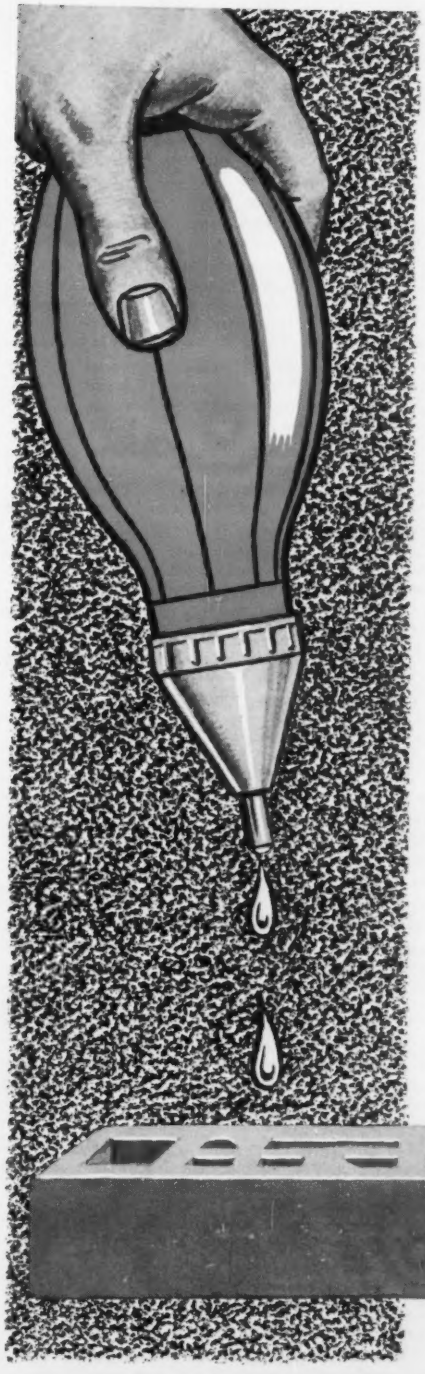
ZINC: High grade 11.00, delivered. Die casting alloy No. 3, 12.75; No. 2 13.25, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$30.00-31.00	$49.00-50.00	.....	.....	.....	.....	$47.00-48.00
Boston*	**23.00-24.00	**28.00-29.00	.....	.....	**31.00-32.00	.....	.....
Buffalo	26.00-27.00	**39.00-40.00	.....	.....	**43.00-44.00	.....	51.00-52.00
Chicago	36.00-37.00	41.00-42.00	.....	46.00-47.00	46.00-47.00	50.00-51.00	51.00-53.00
Cincinnati*	**34.00-35.00	**38.00-39.00	**32.00-33.00	.....	**45.00-46.00	.....	**52.00-53.00
Cleveland	32.50-33.50	42.00-43.00	33.00-34.00	42.00-43.00	47.00-48.00	60.00-61.00	56.00-58.00
Detroit*	**26.00-27.00	**34.00-35.00	**24.00-25.00	**35.00-36.00	.....	.....	.....
Los Angeles	32.00	**41.00	.....	.....	.....	.....	.....
New York*	30.00	35.00-36.00	33.00-34.00	.....	.....	.....	.....
Philadelphia	34.00	38.00	40.00	.....	47.00-48.00	58.00-59.00	56.00-58.00
Pittsburgh	35.00-36.00	40.00-41.00	.....	40.00-41.00	48.00-49.00	.....	54.00-55.00
St. Louis*	33.00	41.00	33.00	44.00	.....	.....	48.00
San Francisco	32.00	42.00	28.00	40.00	40.00	.....	.....
Seattle	27.00	31.00	28.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point



Drop by Drop... IN 1957

FOUNDRYMEN USED

213 TONS OF

LYQUAGRIP*

READY-TO-USE CORE PASTE

FOR THESE 12 ADVANTAGES

1. Unsurpassed for pasting CO^2 cores
2. Ready mixed, uniform at all times
3. Light colored, odorless, non-corrosive, non-fermenting
4. Dries rapidly at room temperatures
5. Unaffected by normal storage
6. Will not boil or blister
7. No appreciable gas generation
8. Pasted joints are stronger than core
9. Unaffected by mold humidity
10. Extra strong, uses 1/3 to 1/5 as much paste
11. Cores may be reheated without damaging pasted joints
12. Washes off hands and tools easily with warm water

Ask for literature or consult our representative

*Trade Mark Reg.

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
75 Westminster St., Providence 1, R. I.

Manufacturers of

LYQUAFLOUR
For cleaner surfaces, better shakeout

JOINT SEAL
Plastic compound for perfect sealing

LYQUAFACE
The Liquid sand grain coating

DOB-IT
Ready-to-use core mudding compound

DUO RESIN
Binder for baking with controlled oven temperatures

Circle 582 on Page 51

the

Moldmaster

revolutionary new

HERMAN

*machine

you saw at the

Cleveland

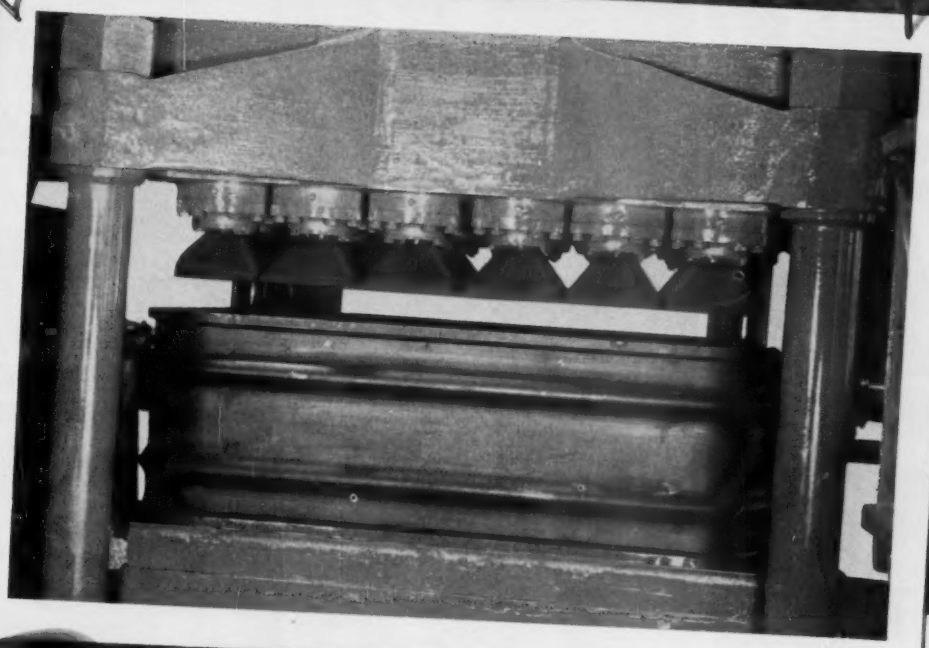
convention!

MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.

FEATURES

1. The Herman Moldmaster may be operated automatically, semi-automatically or by push button control. Adequate interlocks are used in each case so the machine will be operated with safety. The central control panels and all other electrical equipment are dust-proof and built to J.I.C. standards.
2. The Herman Moldmaster has been designed to give maximum versatility for all types of molding. Simultaneous jolt squeeze action as well as the self adjusting squeeze head flows the sand in such a manner as to insure a perfect mold.
3. The Moldmaster has the exclusive HERMAN feature of the squeeze head attached to the Jolt Machine Table. This not only helps the ramming of molds but also eliminates practically all wear to which the standard type squeeze mechanism is subjected, and reduces wear to the pattern equipment.
4. METHOD NO. 1 — The exclusive HERMAN feature of the self adjusting squeeze head, contours the squeeze head for any shape of pattern and allows the increase or decrease of mold hardness at any point.
5. METHOD NO. 2 — The variable hydraulic squeeze pressure unit and self adjusting squeeze head make this machine especially adaptable for squeezing only. More difficult molds can be squeezed than heretofore could be squeezed on standard squeeze machines.
6. METHOD NO. 3 — This simultaneous jolt squeeze method allows the molding to be performed with low pressure air and either a flat or contoured squeeze board.
7. METHOD NO. 4 — The Moldmaster design adapts itself to the use of two different contoured squeeze heads, using low pressure air or high pressure hydraulics as a squeezing medium.
8. Maximum jolting efficiency is assured by the adjustable Jolt Control Valve and a Timing Device.
9. The short, rapid jolt action not only helps the flowability of the sand but also reduces the impact, thus eliminating machine shock and vibration. This feature keeps the foundation mass to a minimum and reduces wear not only on the machine but also the pattern equipment. The result is long life for all machine parts and patterns.
10. The Herman Moldmaster can make cope and drag molds or molds with two different types of patterns simultaneously.
11. The Moldmaster is adaptable for molding with different heights of flasks and incorporates adjustable strike-off bars.
12. The stripping mechanism is controlled by the HERMAN proven pneumatic-hydraulic application to insure fast, smooth, positive control. This feature automatically accelerates and decelerates the stripping action at the proper time with no wearing parts. HERMAN Machines use one stripping cylinder with an extra long guide which insures perfect stripping, thus eliminating a complicated equalizing mechanism.
13. The pneumatically operated mold processing and charge and discharge conveyor incorporates hydraulic cushions to insure fast, smooth, positive control of inertia loads.
14. The carrier plates to which the patterns are attached are not bolted or clamped to the mold processing mechanism but are positioned at the jolt station and stripping stations by means of dowel pins. Thus, by using extra carrier plates on which new patterns have been previously mounted the pattern change time is kept to a minimum.
15. No complicated electronic controls are used. The controls are simplified by the use of positioning contacts.
16. The foundation is inexpensive and is especially adaptable to controlled sand spillage.
17. Sealed anti-friction bearings, hardened bushings, hardened dowel pins and replaceable wear strips are used throughout the machine.
18. All oil reservoirs are self contained in the machine. No extra oil reservoirs are necessary.
19. The Herman Moldmaster is adaptable to a unique flask filling and sand strike-off arrangement. The flask is filled and struck off while moving from either stripping station to the ramming station. This feature insures that the four corners of the flask will be completely filled.
20. All components or assemblies on the Moldmaster can be easily and quickly removed and replaced with spare parts or complete assemblies.

-United States and Foreign Patents Applied For . . .



This machine has been developed to meet the normal molding requirements of most foundries.

The Moldmaster is a jolt, squeeze, strip machine which can be operated by automatic, semi-automatic or push-button controls.

Due to the new principle of simultaneous, hydraulic, self-adjusting squeeze heads and jolt, the sand is compacted in proper relation to the contour of the pattern, thereby producing perfect molds.

Wear on the squeeze head mechanism and pattern equipment is practically eliminated.

Adaptability of a Moldmaster to a wide variety of operating conditions speeds up its amortization.

Complete details are contained in our Technical Bulletin No. JSS-5-58.

HERMAN

Best Known Name in Molding Machines

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

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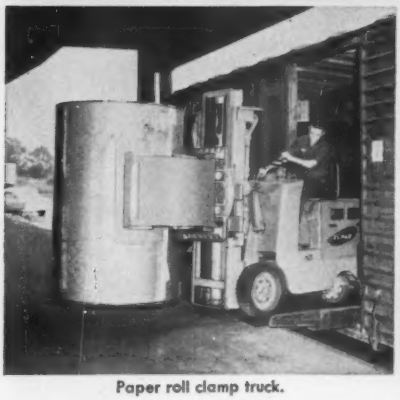
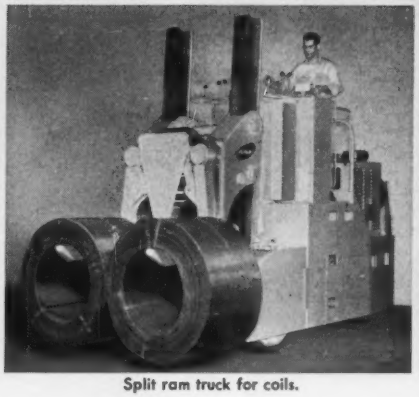
ELPAR®

ELECTRIC TRUCKS...



Paper roll clamp truck.



Split ram truck for coils.

NEW ELPAR electric cotton truck.

Designed to Tame Your Tough Handling Jobs

Put ELPAR trucks with attachments to work and keep your "hard-to-handle" materials flowing smoothly. There are ELPAR attachments for virtually every type of out-of-the-ordinary load. Most are readily interchangeable with forks to provide truly versatile performance.

ELPAR attachments need not be costly. In your case, all that may be required is some minor modification to the standard truck—yet the result could well be a major increase in handling efficiency.

Call in your local ELPAR man. A materials handling expert, he'll help you in proper truck-to-job application. And he'll explain to you why traditional ELPAR electric truck dependability is your assurance of *twice* as many years of dependable service as other power-types—with only *one-third* the operating and maintenance costs.

NEW LITERATURE
Send for New Attachments Brochure and "Gas vs. Electric Truck" Folder.

ELPAR®
ELECTRIC TRUCKS

THE ELWELL-PARKER ELECTRIC COMPANY
4315 St. Clair Avenue • Cleveland 3, Ohio

Twice the Life...1/3rd the Operating Costs

Circle 584 on Page 51

News!

FEDERATED METALS DIVISION

Appointed National Distributor for

REVERE PRIMARY ALUMINUM PIG AND INGOT

for foundry and die casting use

Call the Federated Sales Office near you. Stocks of Revere Primary Aluminum will be carried at strategic points throughout the United States.

NEWARK 1, NEW JERSEY
150 St. Charles Street
Newark phone: Mitchell 3-0500
New York phone: Digby 4-9460

BALTIMORE 24, MARYLAND
Highland & Eastbourne Aves.
Phone: Orleans 5-2400

BOSTON 16, MASS.
Statler Office Bldg.
20 Providence Street
Phone: Liberty 2-0797

PHILADELPHIA 7, PENNA.
1336 Phila. Nat'l Bank Bldg.
Broad & Chestnut Sts.
Phone: Locust 7-5129

PITTSBURGH 24, PENNA.
615 Gross Street
Phone: Museum 2-2410

ROCHESTER 4, NEW YORK
Triangle Building
335 East Main Street
Phone: Locust 2-5250

WHITING, IND. (CHICAGO)
123d St. & Indianapolis Blvd.
Whiting phone: Whiting 826
Chicago phone: Essex 5-5000

BIRMINGHAM, ALA.
Phone: Fairfax 2-1802

CHICAGO, ILL. (WHITING)
123d St. & Indianapolis Blvd.
Chicago phone: Essex 5-5000
Whiting phone: Whiting 826

CINCINNATI, OHIO
1603 Carew Tower
Phone: Cherry 1-1678

CLEVELAND, OHIO
1152 Hanna Building
Phone: Prospect 1-2175

DETROIT 11, MICHIGAN
11630 Russell Street
Phone: Townsend 8-9000

EL PASO, TEXAS
1213 Mills Building
(Asarco Mercantile Co.)
Phone: 3-1852

HOUSTON 29, TEXAS
9000 Market Street Road
P.O. Box 24038
Phone: Orchard 4-7611

MILWAUKEE 10, WIS.
4608 West Burleigh St.
Phone: Hilltop 5-7430

MINNEAPOLIS, MINN.
Phone: Tuxedo 1-4109

ST. LOUIS 10, MISSOURI
4041 Park Avenue
Phone: Prospect 1-8220

LOS ANGELES 23, CALIF.
4010 East 26th Street
Phone: Angelus 8-4291

PORTLAND 9, OREGON
1900 N.W. 18th Avenue
Phone: Capitol 7-1404

SALT LAKE CITY 1, UTAH
700 Crandall Bldg.
Phone: Empire 4-3601

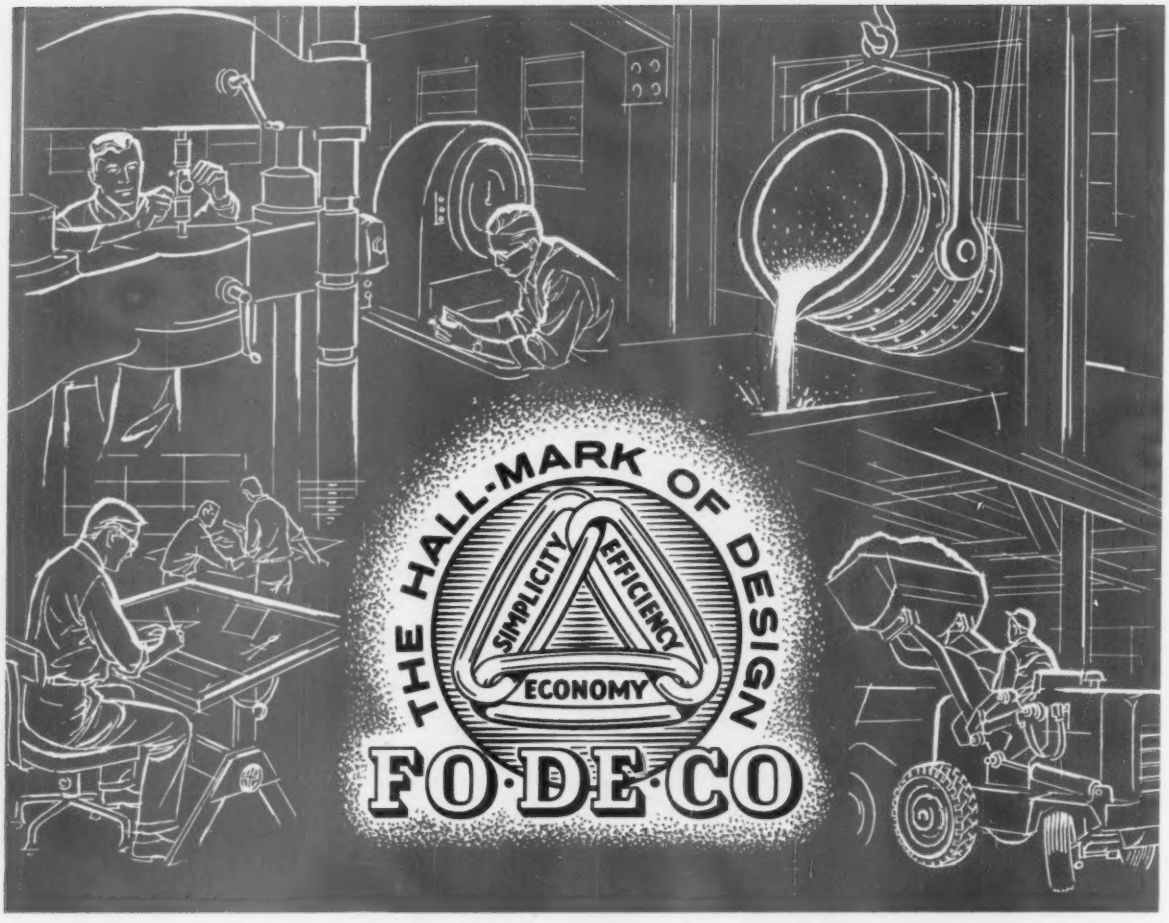
SAN FRANCISCO 24, CALIF.
1901 Army Street
Phone: Atwater 2-3340

SEATTLE 4, WASHINGTON
101 Dakota Street
Phone: Main 3-7160

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

Circle 585 on Page 51



COMPLETE is the word for it!

A Time Tested (Since 1940) Foundry Planning and Engineering Service to Guide Management to PROFITABLE Operation.

As a Foundryman, you are doubtless aware of the industry's many hazards and its sensitivity to mechanical, human and economic elements.

EXPERIENCE and KNOWLEDGE are ESSENTIAL in a business of this type, particularly when new construction, modernization or expansion is planned.

FODECO's staff has been built to serve the foundry industry in ALL of its functions. Our programs are engineered by men who know foundries. We can help you with:

1. **Design and layout**
2. **Raw materials and their handling**
3. **All production methods**
4. **Metal control for specific properties**
5. **Overhead and profits**

Let us inspect your plant and discuss your program with you, at no cost or obligation, of course.

Telephone, write or wire

THE HALL-MARK OF DESIGN
FO·DE·CO

FOUNDRY DESIGN CO.

106 South Hanley Road · St. Louis 5, Missouri · Telephone: VOlunteer 1-5277

Circle 586 on Page 51

This beat his best cut-off wheel by 50%

John Martin, abrasive specialist for Mau-Sherwood Supply Co., knew Bay State's BZ2 was already one jump ahead of competition. Yet, when the new BZ2AA came out, he persuaded Peter Kriegkoff, cleaning room foreman at Cleveland Brass Mfg. Co., to test it thoroughly . . . cutting brass valve bodies under standard production conditions.

Result: 33% more total cuts plus faster cutting which added up to 50% greater efficiency.

Explanation: Bay State's new bond closely matches the wearing and fracturing behavior of the abrasive grain . . . gets more cuts per grain.

The Bay State man in your area can find practical, profitable solutions to *your* grinding problems. Why not look him up—or write us? *Better grinding at lower cost—that is his business.*

BAY STATE WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

Circle 587 on Page 51

grab yourself a **BIGGER**

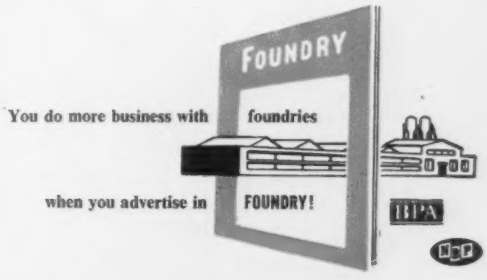
share of this FOUNDRY market...

Grab a sales advantage in this dynamic foundry market *now* and you'll boost future sales, too. The market's growing . . . modernizing . . . mechanizing . . . automating.

Stake your claim to more sales by concentrating your advertising in FOUNDRY. Here your dollars buy more pure sell, because you reach foundries exclusively. Nothing sells foundries like FOUNDRY.

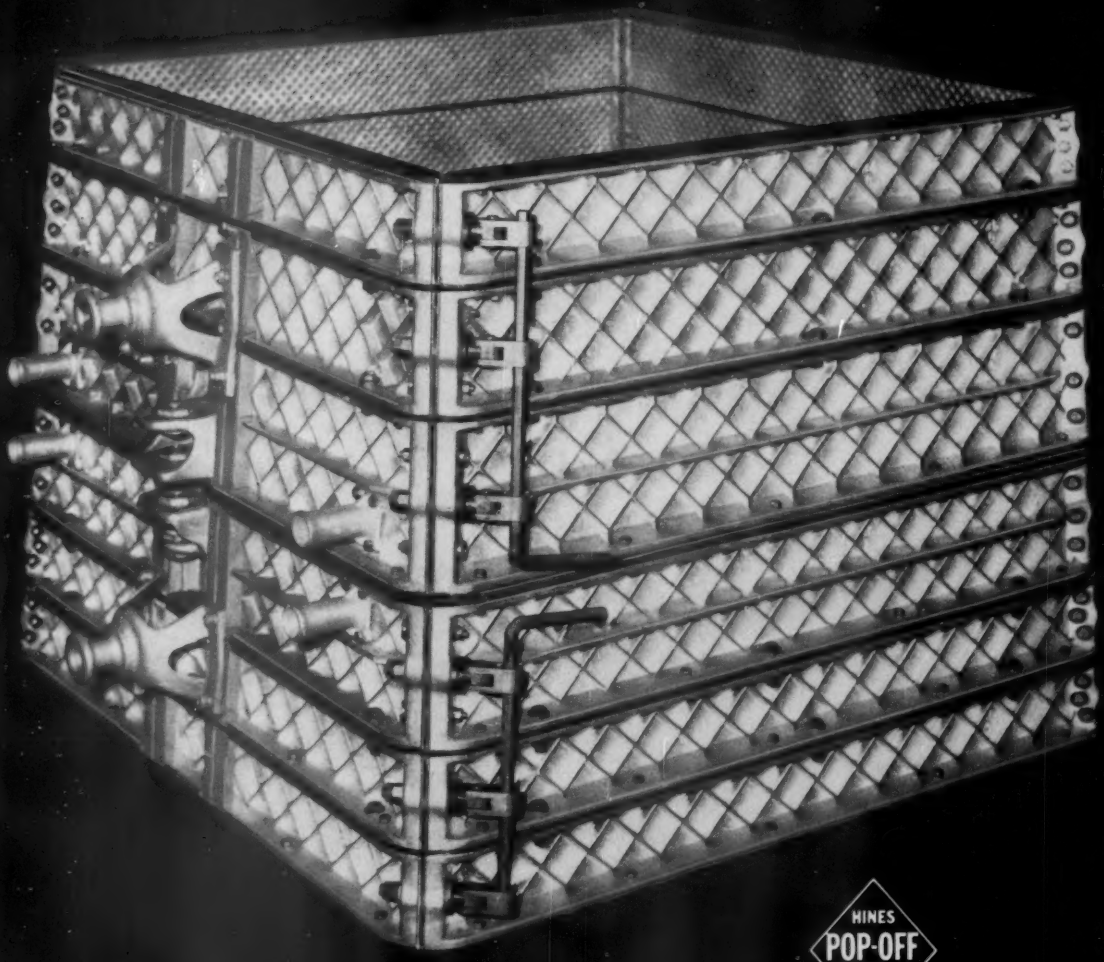
Our PLUS-5 Sales Development Service further steps up the sales power of your advertising. With it, you can pinpoint your prospects, tailor special lists, set up special market controls.

We'll give you full details on request.



a PENTON Publication / Penton Building, Cleveland 13, Ohio

Circle 588 on Page 51

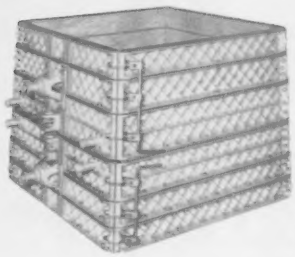


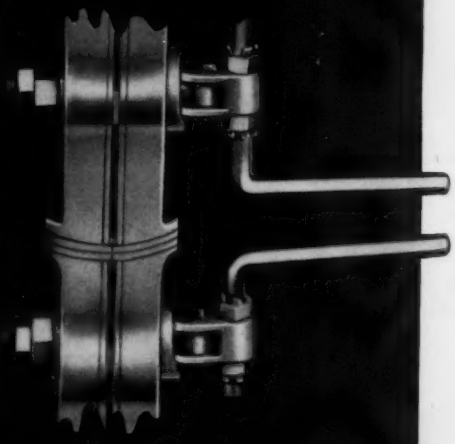
HINES POP-OFF FLASK

MEMBER FEMA

Heavy-duty HINES "POP-OFF" flask, 36" x 36" x 34" high. 7" cope, plus 5" upset, plus 4" upset. 6" drag, plus two 4" upsets. Equipped with trunnions and handles.

HINES FLASK CUTS 12 OPERATIONS DOWN TO ONLY 2!





LOCKED POSITION

UNLOCKED POSITION

PATENTS PENDING

This heavy-duty HINES flask, equipped with the new "POP-OFF" locking mechanism, really cuts down on flask removal time! If fitted with old-style individual levers for each section, six operations would be required to open each corner—twelve operations in all. Now, to open each corner, it's only necessary to grasp the two handles together, turn them 90° and all six sections are unlocked simultaneously! Only two operations to open the entire flask, quickly and smoothly.

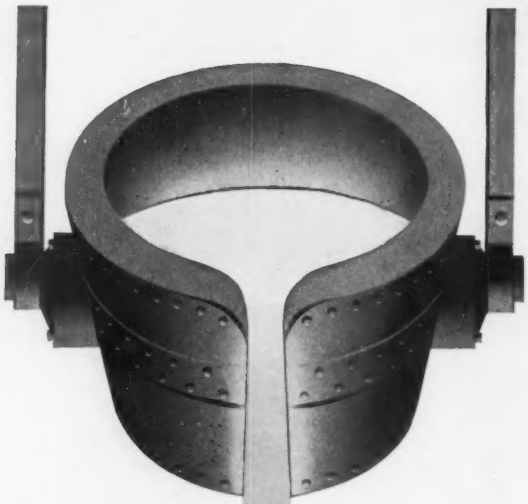
This exclusive locking mechanism is available on all HINES "POP-OFF" flasks, to speed up the opening of any required number of flask sections. It eliminates strain usually exerted on flask and pins when each section is opened separately. Adjustment is easier, too, as nuts and lock nuts merely need to be taken up, to compensate for wear. Replacement of parts, if ever necessary, is a very simple matter.

Next time you're ready to buy flasks, be sure to consider these new, faster-acting HINES "POP-OFF" flasks — for better molds and better castings.

THE HINES FLASK CO.

3431 WEST 140TH STREET · CLEVELAND 11, OHIO

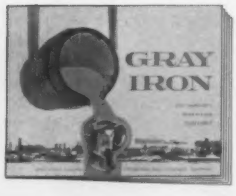
Circle 589 on Page 51



Quality Products for the Foundry Trade

Send for Your Copy of This Free

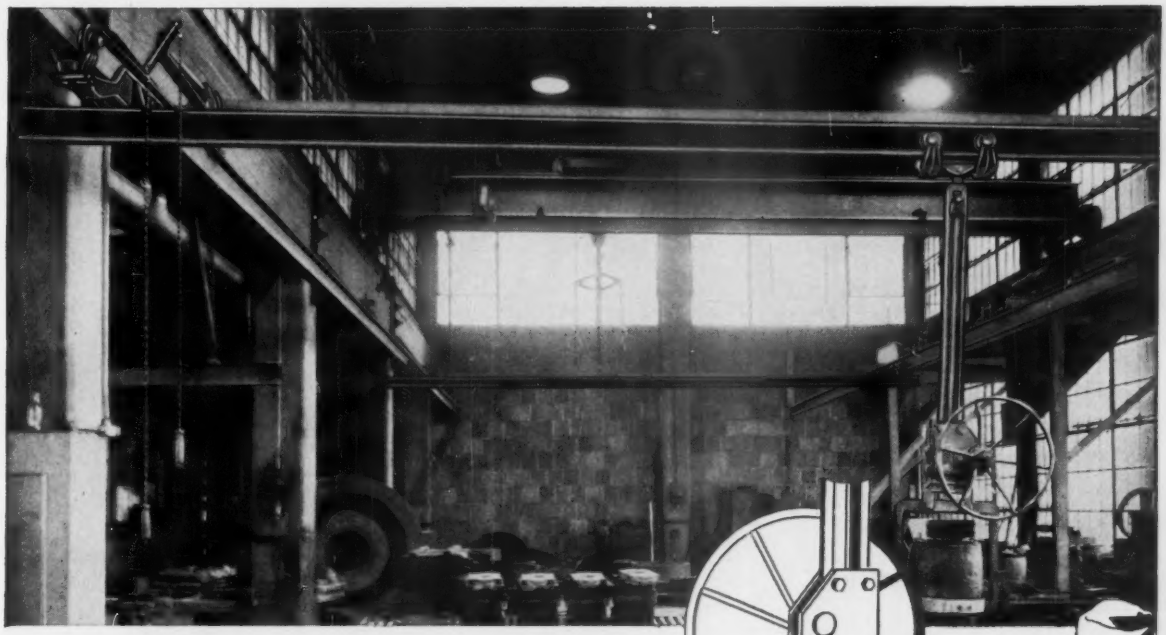
GRAY IRON BROCHURE



An illustrated brochure on the Gray Iron Industry and its place in the nation's industrial economy. Includes descriptive data on casting practices and the story of the production of Neville Pig Iron and Neville Foundry Coke.

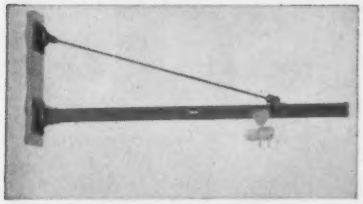
WSW 6394

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

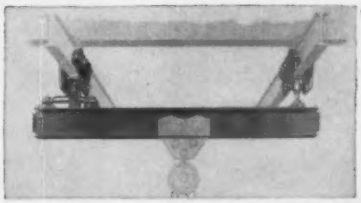


Reduce handling costs with . . . R-W CRANE and "TRU-TRED" MONORAIL SYSTEMS

Modern foundries have found that they can now efficiently and safely cut costs, and speed-up production by installing R-W Cranes and Monorail Conveyor systems. Whether you need a single unit for a specific operation or a complete system, R-W Cranes and Monorail Conveyors combine ladle handling with maximum smoothness and safety, plus 100% utilization of pouring floor area. Transfer crane with safety interlocks at transfer points provide flexibility and easy handling throughout pouring operations. R-W Cranes and Monorail systems are available in a size to efficiently and economically meet your specific requirements.



R-W 939 Swinging Jib Crane . . . available in a wide variety of sizes and capacities up to 4000 lbs. . . . Furnished with rod support. R-W 968 Jib Crane has curved track to support the outer end of boom.



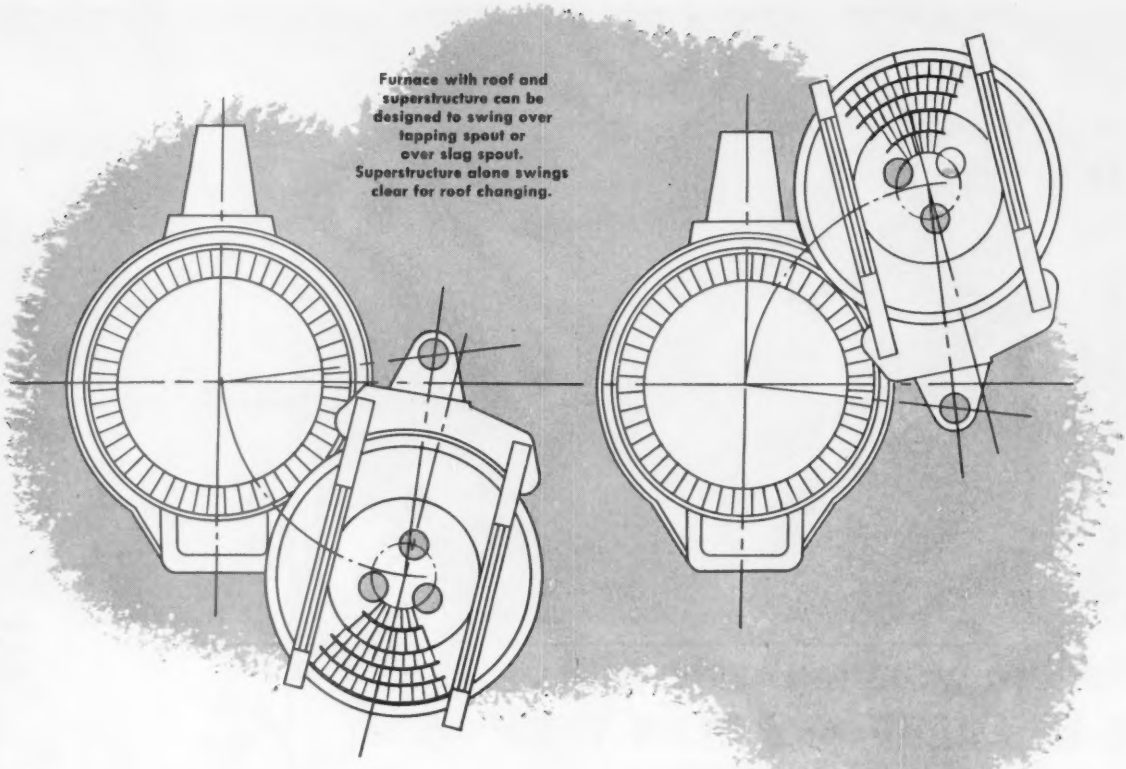
R-W 971 Flexible Traveling Crane . . . self adjusting yoke and cross head . . . will not bind as bridge need not maintain right angles to tracks. Available in variety of sizes and capacities up to 8000 lbs. Not applicable as a transfer crane.

Why not let an R-W Sales-Engineer show you, without cost or obligation, how R-W equipment can effect remarkable savings for you in time, money and maintenance. Write today for complete information.

Richards-Wilcox
MANUFACTURING COMPANY
"MATERIAL HANDLING DIVISION"

466 W. THIRD STREET, AURORA, ILLINOIS • Branches in Principal Cities

Circle 591 on Page 51


Furnace with roof and superstructure can be designed to swing over tapping spout or over slag spout. Superstructure alone swings clear for roof changing.

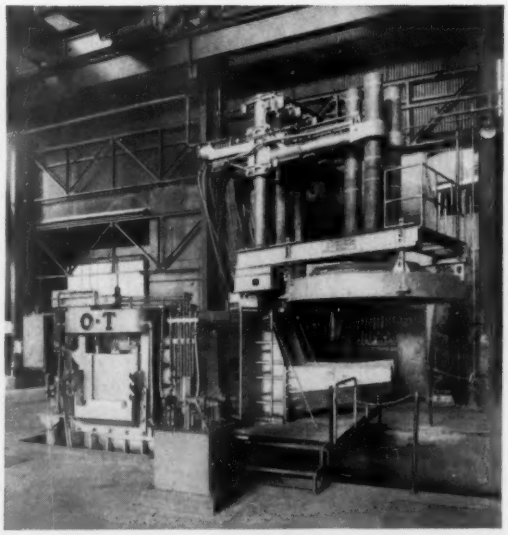
With a Lectromelt Furnace you have a choice

THE ROOF CAN BE BUILT FOR FRONT OR BACK SWING

SELECT the direction of swing that best fits your plant layout—over the tapping spout or over the slag spout. Lectromelt's design and method of separately supporting the roof structure makes this possible. You profit by the greater efficiency and convenience that result.

Note in the above drawing how the furnace top swings clear of the furnace; there's no interference with the charging bucket to slow down the charging operation. Lectromelt places the pivot point away from the furnace shell to accomplish this. And, because the swing of the top can be less, there's less strain on the conductors.

Catalog No. 10 describes Lectromelt furnaces. For a copy write Lectromelt Furnace Division, McGraw-Edison Company, 314 32nd Street, Pittsburgh 30, Pennsylvania.



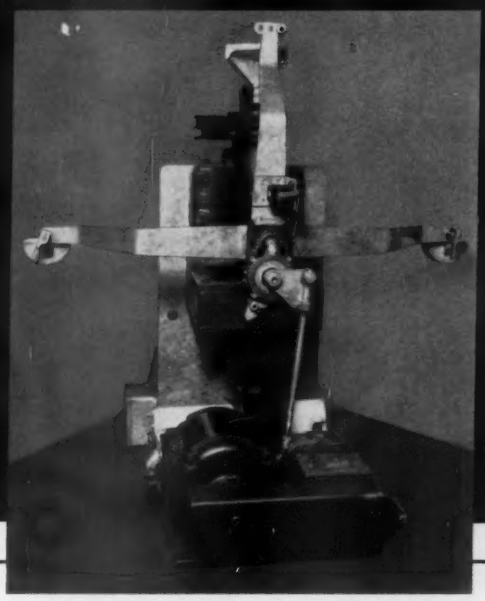
Lectromelt®

McGRAW EDISON

CANADA: Canefco Limited, Toronto . . . ARGENTINA: Master Argentina, Buenos Aires . . . ITALY: Forni Stein, Genova . . . ENGLAND: Electric Furnace Co., Ltd., Weybridge . . . GERMANY: Demag-Elektrometallurgie, GmbH, Duisburg . . . SPAIN: General Electrica Espanola, Bilbao . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Stein & Roubaix, Bressoux-Liege . . . JAPAN: Daido Steel Company, Ltd., Nagoya

CLEVELAND is the name and the place for ABRASIVES

Why not buy Abrasives on Fact?



Here at Cleveland, we feel that a buyer of metallic abrasives should be able to do just that.

The breakdown tester we use is shown herewith, and it's designed to separate the fact from the fiction.

After 100 passes through this tester, at 7200 r.p.m., we *know* how good our abrasives are and how long they will last.

This tester, combined with our other extensive laboratory equipment, is an integral part of our production control system.

All of it, of course, is working hard every day to give you top-quality, long-life, economical Metallic Abrasives . . . based on fact.

There are more details in our catalog, which is yours for the asking.

COMPARATIVE TEST REPORT

MATERIAL TESTED — S660 CHILLED IRON SHOT

A - Cleveland Metal Abrasive B - Competitors C - Competitors

SCREEN ANALYSIS

U.S. No.	S.A.E. Spec.	A	B	C
8	0	0	0	0
10		35.5	54.0	36.0
12	85	60.3	36.2	48.0
14	12	4.2	7.7	14.0
Pan	3	0	1.1	2.0

CHEMICAL ANALYSIS

	A	B	C
T.C.	2.72	3.29	2.42
Si	1.13	1.36	1.20
Ph	.056	.380	.130
Mn	.40	.36	.47
S	128	.176	.141

Rc HARDNESS

	A	B	C
Low	58	59	57
High	62	65	62
Average	60	63	59

BREAKDOWN TEST

Thru U.S. No. 10 on U.S. No. 12 — No. of Grams Tested—100 — 100 Passes at 7200 R.P.M.

	A	B	C
12	0	0	0
14	.2	0	.1
16	.4	0	.5
18	4.8	.1	3.5
20	15.6	.2	9.4
25	24.4	7.9	20.7
30	13.5	8.4	12.1
35	9.9	10.6	11.5
40	4.1	11.3	6.0
45	2.7	7.1	4.6
50	2.0	14.2	3.4
Pan	13.7	27.6	17.8
Loss	8.7	12.6	10.4

Remarks — C.M.A. material best by test. *B.M.*

CLEVELAND ABRASIVES

1. Realsteel Shot and Grit 2. Pearlitic Malleable 3. Normalized
4. "A" Iron 5. Hi-Strength "B" 6. Chilled Iron 7. Drawn Steel

World's Largest Producer of Metallic Abrasives

CLEVELAND *metal abrasive co.*

General Office: 888 East 67th Street • Cleveland 8, Ohio

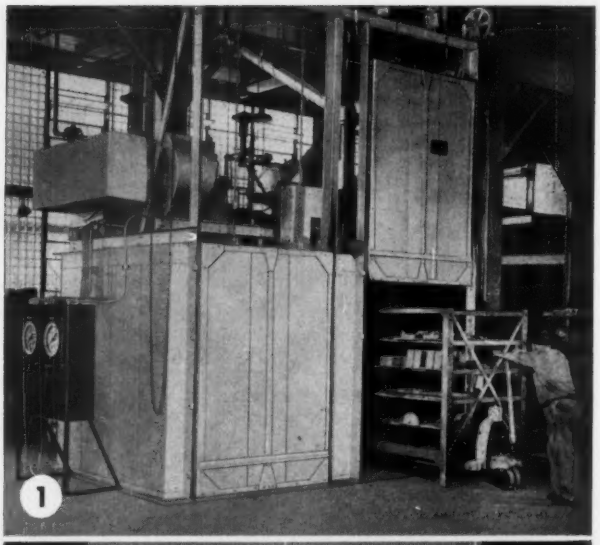
Plants at: Howell, Michigan; Toledo; Cleveland; Northfield, Ohio

Circle 593 on Page 51

carl mayer CAN DO IT

That's right, for any baking requirement there's a Carl Mayer oven that will do the job faster and at less cost, to give you the efficiency so necessary in today's competitive markets.

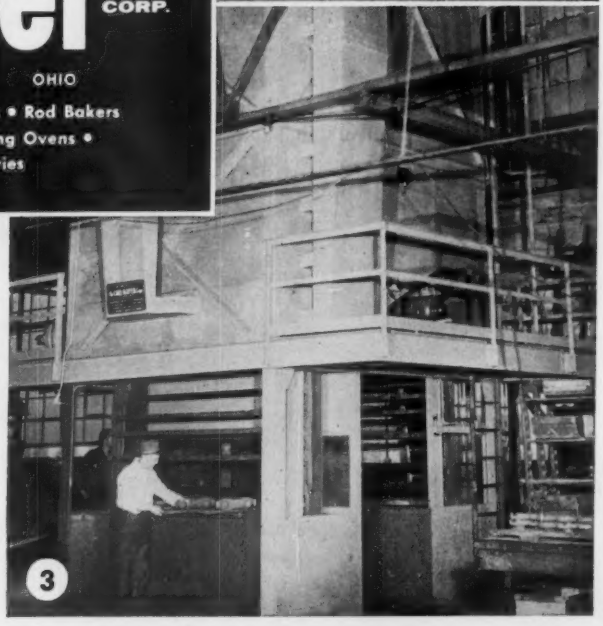
The exclusive heat recirculation and slotted panel construction features cut fuel costs and heating times by as much as 50%. Uniform temperatures, assured by heat recirculation, guarantee perfect baking conditions throughout the entire oven.



THE **carl mayer** CORP.

20800 CENTER RIDGE ROAD CLEVELAND 16, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories



Hundreds of modern foundries of all sizes have found the efficiency and economy of Carl Mayer ovens pay off. Find out for yourself. Our engineers will be happy to consult with you on your particular problem.

1 **This rack type oven, with heat recirculation, holds temperatures within ±5° throughout the oven.**

2 **Downdraft heating method on this car type oven increases efficiency up to 50%.**

3 **This vertical oven features the special internal heat fan—increases efficiency, lowers maintenance cost.**

Write for Bulletin 53-CM

Circle 594 on Page 51

Reader Information Service

FOUNDRY

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 193 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

FURTHER INFORMATION on Advertised Products ?

July 1958

SIMPLY CIRCLE AD ITEM NUMBER BELOW

551	566	581	596	611	626	641	656
552	567	582	597	612	627	642	657
553	568	583	598	613	628	643	658
554	569	584	599	614	629	644	659
555	570	585	600	615	630	645	660
556	571	586	601	616	631	646	661
557	572	587	602	617	632	647	662
558	573	588	603	618	633	648	663
559	574	589	604	619	634	649	664
560	575	590	605	620	635	650	665
561	576	591	606	621	636	651	666
562	577	592	607	622	637	652	667
563	578	593	608	623	638	653	668
564	579	594	609	624	639	654	669
565	580	595	610	625	640	655	670

671	686	701	716	731	746	761	776
672	687	702	717	732	747	762	777
673	688	703	718	733	748	763	778
674	689	704	719	734	749	764	779
675	690	705	720	735	750	765	780
676	691	706	721	736	751	766	781
677	692	707	722	737	752	767	782
678	693	708	723	738	753	768	783
679	694	709	724	739	754	769	784
680	695	710	725	740	755	770	785
681	696	711	726	741	756	771	786
682	697	712	727	742	757	772	787
683	698	713	728	743	758	773	788
684	699	714	729	744	759	774	789
685	700	715	730	745	760	775	790

791	806	821	836	851	866	881	896
792	807	822	837	852	867	882	897
793	808	823	838	853	868	883	898
794	809	824	839	854	869	884	899
795	810	825	840	855	870	885	900
796	811	826	841	856	871	886	901
797	812	827	842	857	872	887	902
798	813	828	843	858	873	888	903
799	814	829	844	859	874	889	904
800	815	830	845	860	875	890	905
801	816	831	846	861	876	891	906
802	817	832	847	862	877	892	907
803	818	833	848	863	878	893	908
804	819	834	849	864	879	894	909
805	820	835	850	865	880	895	910

EXTRA COPIES OF ARTICLES ?

FILL IN PAGE NUMBER AND TITLE OF ARTICLES DESIRED

Page No.	Title of Article
.....	.....
.....	.....
.....	.....

This card good in U.S. and Canada only—Expires Sept. 15, 1958

NAME .....

POSITION .....

FIRM .....

STREET .....

CITY ..... ZONE.....

STATE .....

PRODUCT MANUFACTURED .....

FURTHER INFORMATION on Advertised Products ?

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555	570	585	600	615	630	645	660
556	571	586	601	616	631	646	661
557	572	587	602	617	632	647	662
558	573	588	603	618	633	648	663
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560	575	590	605	620	635	650	665
561	576	591	606	621	636	651	666
562	577	592	607	622	637	652	667
563	578	593	608	623	638	653	668
564	579	594	609	624	639	654	669
565	580	595	610	625	640	655	670

671	686	701	716	731	746	761	776
672	687	702	717	732	747	762	777
673	688	703	718	733	748	763	778
674	689	704	719	734	749	764	779
675	690	705	720	735	750	765	780
676	691	706	721	736	751	766	781
677	692	707	722	737	752	767	782
678	693	708	723	738	753	768	783
679	694	709	724	739	754	769	784
680	695	710	725	740	755	770	785
681	696	711	726	741	756	771	786
682	697	712	727	742	757	772	787
683	698	713	728	743	758	773	788
684	699	714	729	744	759	774	789
685	700	715	730	745	760	775	790

791	806	821	836	851	866	881	896
792	807	822	837	852	867	882	897
793	808	823	838	853	868	883	898
794	809	824	839	854	869	884	899
795	810	825	840	855	870	885	900
796	811	826	841	856	871	886	901
797	812	827	842	857	872	887	902
798	813	828	843	858	873	888	903
799	814	829	844	859	874	889	904
800	815	830	845	860	875	890	905
801	816	831	846	861	876	891	906
802	817	832	847	862	877	892	907
803	818	833	848	863	878	893	908
804	819	834	849	864	879	894	909
805	820	835	850	865	880	895	910

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FOUNDRY

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Thinking of automation?

The Universal Mold Conveyor is typical Jeffrey automation equipment — moves molds on the level, up, down and around.

Jeffrey builds single units and/or builds the entire system

Your men work at elevations best suited to each operation, with the Jeffrey universal mold conveyor on the job. Their tasks are eased and manufacturing efficiency is maintained at high levels, helping to boost earnings.

Flow of such materials as sand, castings, coke, limestone and iron borings is handled by Jeffrey vibrating feeders and conveyors, electric or mechanical types. They may serve as cooling conveyors, carrying castings from shakeout, and even the most fragile castings are handled safely.

Jeffrey mechanizes the handling of sand; overhead belt conveyors distribute sand to molders' stations, carry it from shakeout to Jeffrey sand conditioning plant and back to molders. Catalog 911 describes all of this foundry equipment. For a copy, write The Jeffrey Manufacturing Company, 907 N. Fourth Street, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

Circle 595 on Page 51

with the *Exclusive*

fine FANNER FAN-S-CHILLS

provide superior chilling and greater savings

A triumph of modern research and engineering — the FAN-S-CHILL, through its curved "S" design, provides 75% more chilling surface since there is no solid mass.

Exclusive design with its perforated surface and double channel permits maximum parent metal fill-in . . . fuses into cast metal solidly, completely . . assures better quality castings.

Formed steel fabrication provides highest possible chilling efficiency . . . ideal for general chilling purposes . . . especially in steel.

Lightweight construction provides triple savings — in cost, in shipping and in handling.

Get the facts on the many cost saving features of the fine FANNER FAN-S-CHILL . . . write today for samples and latest prices.

SPECIFICATIONS:

WIDTH: ⅜" — ⅝" — ¾" — 1" — 1¼"

LENGTH: ½" to 5"

Made in heavy, medium and light gauges.

Copper, aluminum or tin coated.

Lighter or heavier FAN-S-CHILLS in special sizes can be made on request.

ENGINEERING SERVICE:

Qualified and specialized engineers in Fanner's Technical Service Division are available for consultation, without obligation, on problems of producing more intricate castings; developing increased strength, closer tolerances, and better quality; reducing machining and improving finish — both in ferrous and non-ferrous castings. Take advantage of the research and development work that Fanner has invested in this field to improve your profit picture! Simply direct your request to the address shown below.

THE FANNER MANUFACTURING CO.

Designers and Manufacturers of FINE FANNER CHAPLETS AND CHILLS

BROOKSIDE PARK CLEVELAND 9, OHIO

CURVED "S" DESIGN

LIGHTWEIGHT

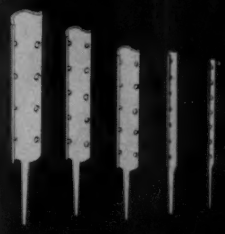
Savings in cost. Lower shipping charges. Easier to handle on the job.

GREATER FUSION

No pockets to trap gases. Perforations permit metal flow-through. So completely fused, difficult to detect even with X-ray.

GREATER CHILLING SURFACE

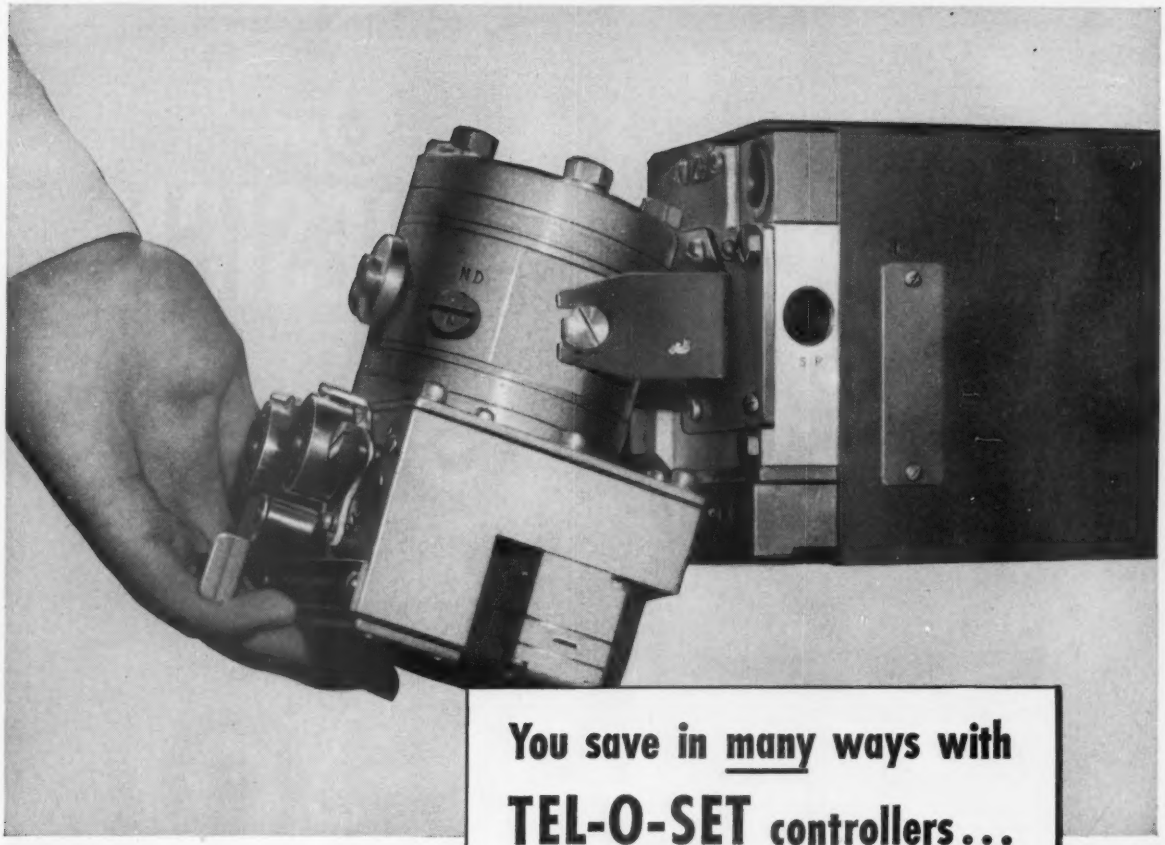
75% greater chilling area since there is no solid mass — produces better castings.



5 STANDARD SIZES

The ideal chill for a wide range of applications. A size for every need — eliminates makeshift chilling.

Circle 596 on Page 51



You save in many ways with TEL-O-SET controllers...

... today's most advanced pneumatic controllers

Control any process variable with a simple yet highly sensitive *Tel-O-Set* controller. Get all the high-performance characteristics you expect from a modern controller . . . plus specific savings.

CUT INSTALLATION COSTS

- Quick-connect assembly makes controller mounting easy.
- Mounting manifold preserves quick-connect and bumpless transfer features.

CUT SPARE PARTS INVENTORY

- Only one basic controller needed for all applications.
- Add rate action easily for more complex processes.

REDUCE PROCESS DOWNTIME

- Process remains on manual control when controller is removed.
- Unique design eliminates start-up overshoot.

SAVE MAINTENANCE

- Foolproof reassembly after cleaning and servicing.
- Repairs easily made by any maintenance man.

Get complete details on controllers and other *Tel-O-Set* instruments from your nearby Honeywell field engineer. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

First in Controls

Circle 597 on Page 51

Tousey offers a new water reduceable sealer

Here is a product that offers many advantages to manufacturers of both automotive and agricultural equipment.

Tousey's water reduceable sealer uses tap water in production—effecting an immediate economy over sealers that use regular naphtha or benzine type solvents.

Tousey's water reduceable sealer has no undesirable odor and it is non-toxic. Being free of flammable solvents it is also safer to use.

With water as a base, clean-up costs are reduced to a minimum if application instructions are followed.

Tousey's water reduceable sealer meets the performance requirements of leading automotive and agricultural manufacturers. It is available in standard sealer colors.

Tousey also manufactures Lacquer, Rubber base, Alkyd and Hot Dipping type sealers.

Write and give us details on your specific sealing problems—we will have our laboratory send the proper recommendations to you.

TOUSEY PRODUCTS

DURACOTE for DURABILITY

TOUSEY VARNISH CO.

520 West 25th Street • Chicago 16, Illinois
VIctory 2-2200

Circle 598 on Page 51

BETTER.. CLEANER CASTINGS...

AND MORE OF THEM

at lower cost . . .

WITH

DELTA CORE AND MOLD WASHES

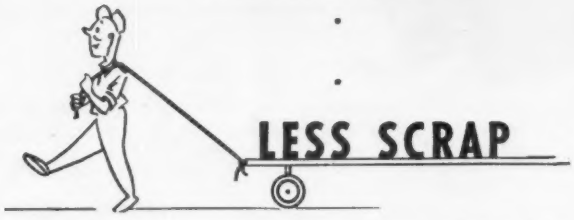
for . . . . . .

CLOSER TOLERANCE

. . . cores and molds have better dimensional stability . . .

LOWER CLEANING ROOM COSTS

. . . surfaces are smooth and require a minimum amount of cleaning . . .



LESS SCRAP

. . . greater number of perfect castings.

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA

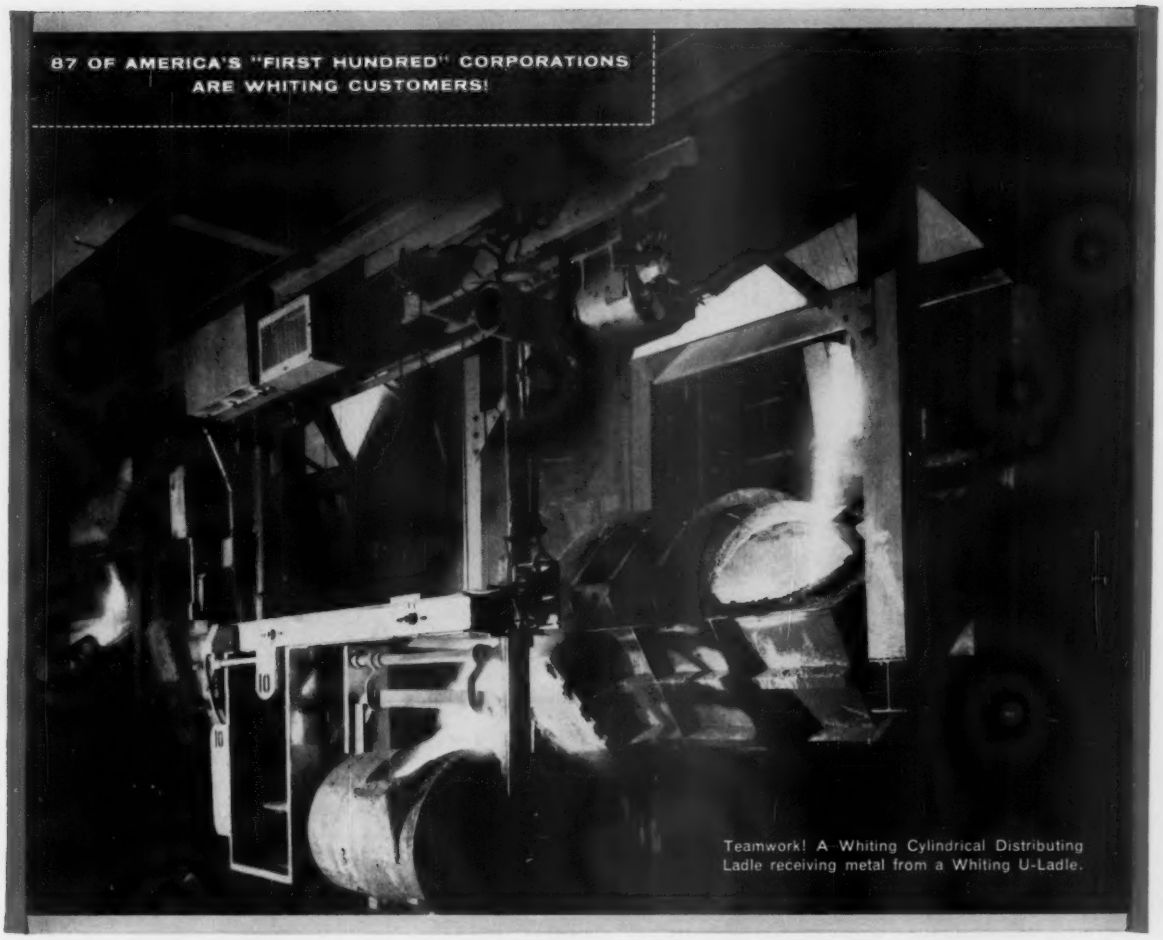
ALL DELTA CORE AND MOLD WASHES are easy to apply. After proper mixing they remain in suspension indefinitely. In use, they are non-reactive with molten metal . . . liberate no gases and are highly refractory.

There is a DELTA WASH for every type of metal casting.

DELTA OIL PRODUCTS CORP.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN


87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS
ARE WHITING CUSTOMERS!
Teamwork! A Whiting Cylindrical Distributing Ladle receiving metal from a Whiting U-Ladle.

WHITING ENGINEERED LADLES...

For the Pouring Performance That Pays Off!

Pouring proficiency is an inherent quality in every Whiting engineered ladle.

That's because Whiting knows ladles . . . has more than 70 years experience in designing them to perform better, control easier, last longer.

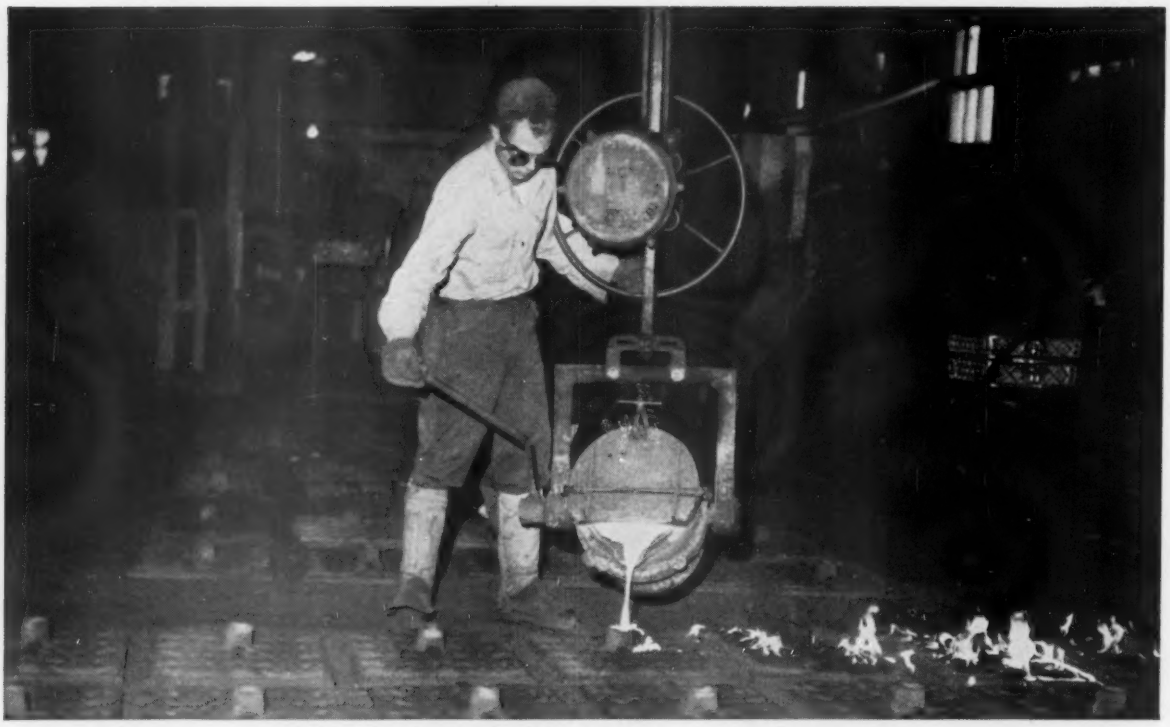
Rugged, long-time favorites of foundrymen everywhere, Whiting ladles are built for highly specialized applications as well as for the more commonplace . . . and all feature the Whiting exclusives that speed pouring, bring new economy to cupola and electric furnace operations!

Send today for complete information on all Whiting ladles—hand and shank, covered trolley, covered crane, riveted crane, geared bottom-tap, non-geared up to 100 ton capacity, cylindrical, mixing and reservoir ladles. Ask for the booklet by name: "Whiting Ladles"

Whiting Corporation, 15607 Lathrop Avenue, Harvey, Illinois.

WHITING

FOUNDRY EQUIPMENT



NEW LOOK at Drake foundry. Durez-bonded shells are poured horizontally. Then bedding sand is thrown over the poured shells and another layer is started.

"Tough—but worth it!" says small foundry taking the big step to shell mold castings

Can a progressive small foundry compete with larger ones in the production of shell mold castings?

"Yes!" says the management of Drake Manufacturing Co., Inc., Friendship, N. Y.

Drake, with about 50 employees, was producing 250 tons/month of production and semi-production gray iron castings. In shell molding, Drake managers saw an opportunity to broaden services, boost plant output 40%.

Help—from a customer

Drake men went to see a customer—a company buying production castings requiring close accuracy (±1/64" on many dimensions, .040" finishes on most surfaces, and pressure tightness). The castings were to be machined in a highly automated line.

The customer listened as Drake men explained why shell mold castings would increase his machine production by reducing material removal, and give him more uniform castings.

Then he wrote an order for pattern equipment plus a substantial number of castings.

It took about four months, including pattern-making time, for Drake to get into full production of shell mold castings. Initial progress was not smooth. Drake management spent hundreds of hours on the new process. Many tests were run again and again before definite conclusions could be reached.

Help from Durez, too

Through the changeover period, an experienced Durez man was on the job, too. He checked trial castings; adjusted sand-resin ratios; made useful recommendations based on Durez know-how in foundry resins.

Drake men agree their effort is paying off now—in dimensional accuracy of castings, fine surface finish, and low cost over long runs.

Less manpower per mold

An outstanding advantage of shell molding, Drake discovered, is the semi-skilled labor cost. Skilled labor is used only on the pattern—not on the molding floor. Lower costs per mold result.

Semi-skilled operators can make the molds. Nearly one-third of the cores produced at Drake come from two new machines operated by one man *without previous foundry experience.*

Only a few months after first deciding to look at shell molding, Drake management sums up:

"We are pleased with the shell operation at our plant—and most important is the satisfaction of our customers with the castings."

In this successful venture, Drake depends exclusively on Durez foundry resins. You can get results like Drake's, too—accuracy, good surface finish, low cost—when you choose Durez for *your* shell molding resin requirements.

To learn how foundries are using these resins, and to get an idea of the results they enjoy, write us today asking to receive issues of fact-filled "Durez Shell Molding News."

DUREZ® HOOKER CHEMICALS PLASTICS

PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY

1007 Walck Road • North Tonawanda, N. Y.

Cross section of motor cover casting shows how iron must fill both fins and center hub to solve heat diffusion problem.

Laytham casts complex thick-and-thin motor housings with HANNA PIG IRON

Electric motor housings today are a large volume item produced by Laytham Foundry, Inc., Paterson, New Jersey.

When the National Electrical Manufacturers Association raised its motor ratings, it presented Laytham with a challenge—and a new business opportunity. Where many former housings were made of pressed steel in welded sections, the need for greater heat diffusion would favor cast iron, providing the proper combination of thick and thin elements could be achieved.

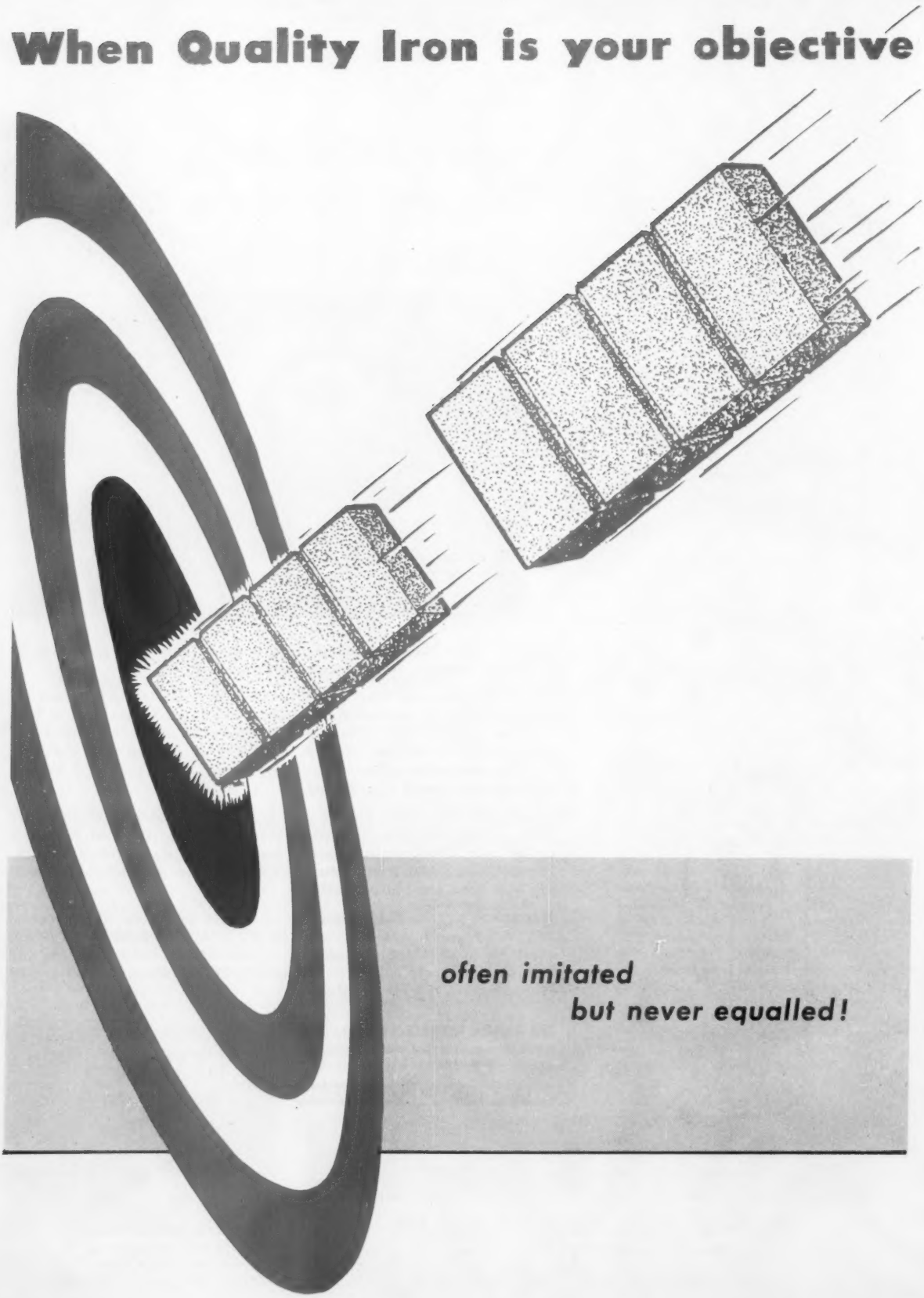
Laytham did it. Now they regularly produce motor frame castings with a wide variation in section thickness from thin fins to heavy center hubs. Such castings require iron with a high degree of fluidity. It must also shrink evenly and be free of porosity. Hanna Malleable pig iron filled the bill perfectly.

Hanna has a grade of high-quality pig iron to meet your requirements, too. All regular grades, plus HannaTite and Hanna Silvery, are available in 38-pound pigs and the smaller HannaTen ingots. For pig iron that will help solve your metallurgical problems, call on one of Hanna's trained representatives.

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION

Circle 612 on Page 51

When Quality Iron is your objective



often imitated
but never equalled!

. . . you're "On Target" with . . .

Famous CORNELL CUPOLA FLUX

Famous CORNELL CUPOLA FLUX makes the difference: produces cleaner iron from your cupola

Famous Cornell Cupola Flux produces a cleaner metal with greater fluidity. You get superior castings with better machinability, greater tensile strength, uniformity of hardness and more uniform graphite distribution from light to heavy sections.

This superior flux increases efficiency in cupola operation giving you cleaner drops with bridging over practically eliminated! Cupola linings need less patching because of protective glazed or vitrified surface which is formed on brick or stone. Hundreds of foundries now use Cornell Flux. If you are not one of them it will pay big dividends to investigate now!

The Benefits . . . The Advantages of Famous CORNELL Aluminum and Brass Flux

- Makes metal pure and clean.
- Permits use of more scrap without danger of dirt, porous places or spongy spots due to dirty metal.
- Thinner, yet stronger sections can be poured.
- Metal does not cling to the dross, as readily.
- Crucible or furnace linings are kept clean and preserved.
- Cleanses molten brass whether red or yellow even when the dirtiest brass turnings or sweepings are used.
- Saves considerable tin and other metals.
- Forms a perfect covering over the metal during melting, prevents oxidation and reduces obnoxious gases to a great extent.

Write for Bulletin 46-A.

The CLEVELAND FLUX Company
1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO
Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

precise heat for precision casting

You'd *expect* the accurate heat of an induction furnace to be an important consideration in permanent mold, shell mold, and investment casting . . . and it *is!* But in addition to precise temperature control, Ajax-Northrup high frequency induction furnaces provide the precision foundry with *flexibility*, *purity*, and *economy*. That's why Ajax leadership in melting for precision casting has never been challenged.

One furnace—hundreds of alloys: Ajax-Northrup furnaces can handle any one or all of the hundreds of ferrous and non-ferrous alloys being made today. For many alloys, it's the only furnace that *can* be used. Magnet alloys, for example, depend on the inherent stirring action which assures ideal dispersion of all elements throughout a melt . . . and the most uniform possible cast part analysis.

Pure metal protects part quality: There's no flame, no smoke, no physical contact between coil and metal. Melts are always 100% on analysis, because there's no chance of contamination . . . particularly important when you're dealing with the finicky alloys common in precision casting.

A better melt at a lower cost per melt: Because every melt is uniform and to exact composition, bad melts become a thing of the past. Subsequent machining is minimized. Ajax-Northrup's unique control system assures maximum melting efficiency—lower melting costs. And new, compact designs minimize floor space requirements, installation costs and maintenance.

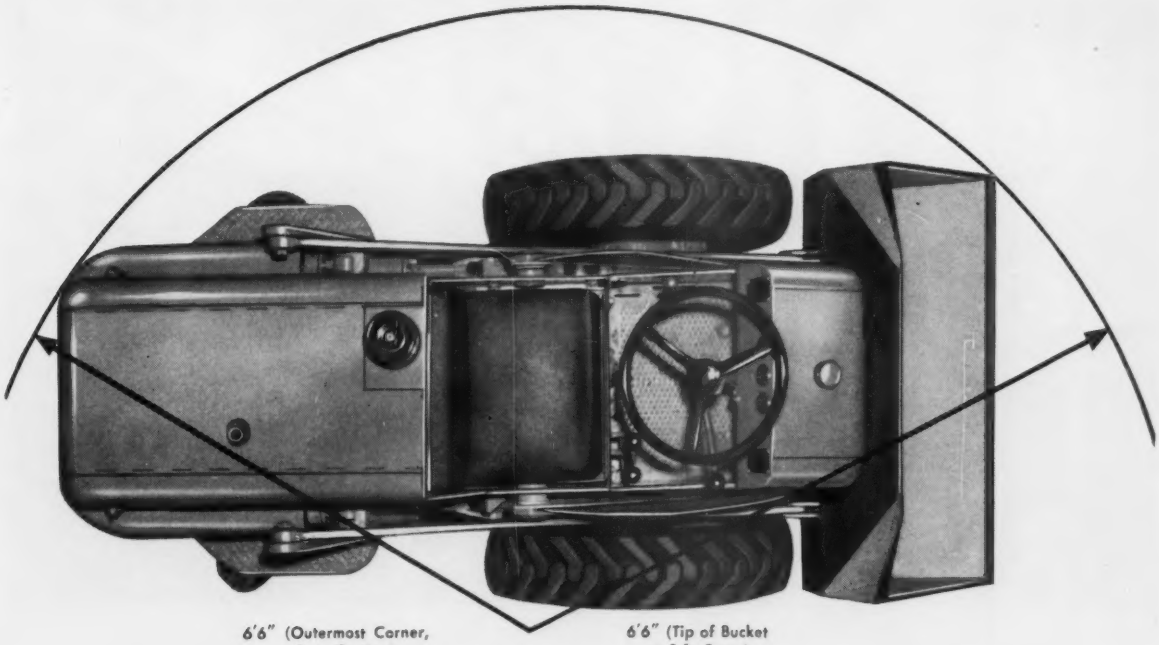
Induction heating & melting

AJAX

NORTHRUP

Available in every conceivable capacity from a few ounces to several tons . . . powered by massive motor-generator sets or economical converters . . . there's an Ajax-Northrup induction furnace sure to satisfy your needs perfectly. We'll gladly send you further information or, if you wish, arrange a meeting with qualified furnace engineers to discuss your special requirements. Ajax Electrothermic Corporation, Ajax Park, Trenton 5, New Jersey.

ASSOCIATED COMPANIES: AJAX ELECTRIC COMPANY-AJAX ENGINEERING CORPORATION



SHORT TURNING RADIUS

ONE EASY TURN FOLLOWS ANOTHER

with this short-turning, power-steered

TL-6 TRACTOLOADER®

Here is a loader your operator can really "wheel" through narrow aisles and doorways, around columns and posts, into and out of boxcars.

Turning and maneuvering is a pleasure — not a chore — with the short, 6½-ft turning radius and POWER STEERING — standard on the TL-6.

There are other easy-operating features, too. For instance — no shifting of gears during normal working cycles. Operator changes direction by simply pulling or pushing a single lever. Bucket controls are quick-acting, smooth-working — conveniently located alongside the operator. And the entire operator's compartment is designed to give him more comfort!

Let your Allis-Chalmers dealer put the versatile TL-6 through its paces . . . show you how it can save you time and money on your "confined-area" material handling jobs.

Turns from a 7½-ft aisle into a 6-ft doorway

CAPACITY:	1.5 cu ft
ENGINE:	gasoline, 33.7 hp; diesel, 38 hp
SPEEDS:	2 forward, to 7 mph 2 reverse, to 14 mph
WEIGHT:	gasoline, 6,100 lb; diesel, 6,500 lb

TRACTO — a sure sign of modern design

SOLD AND SERVICED BY YOUR ALLIS-CHALMERS DEALER

Send For Free Descriptive Catalog
On the Complete Line of TRACTOLOADERS

TRACTOMOTIVE

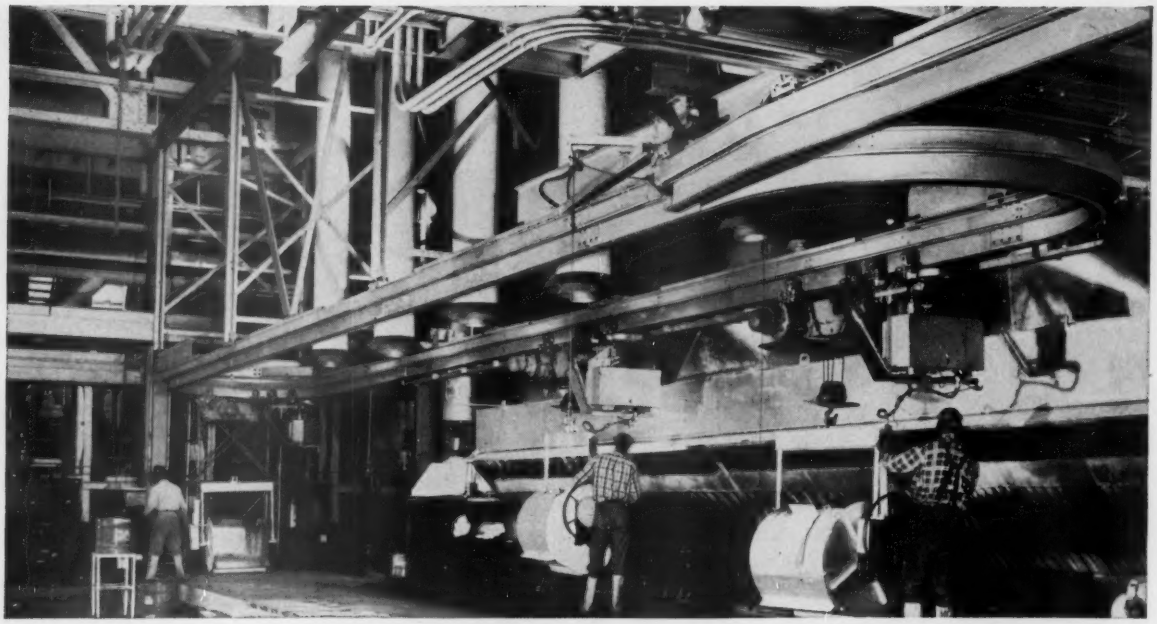
TRACTOMOTIVE CORPORATION, DEERFIELD, ILLINOIS

TRACTOMOTIVE CORPORATION, Dept. F
Deerfield, Illinois

☐ Please arrange a demonstration of the TL-6
☐ Send catalog on TRACTOLOADERS

Name.....
Title.....
Company.....
Address.....
City..... State.....

Circle 605 on Page 51



Here's a way to make your lost ceiling space pay off

AMERICAN MONORAIL

Floor space is unobstructed, free of traffic with American MonoRail overhead handling.

increases plant capacity... cuts handling costs... reduces worker fatigue... minimizes damage and loss.

You can get more profit out of your plant. American MonoRail Engineers can show you how to convert lost ceiling space—eliminate obstructive storage around machines—and gain additional operating area. Find out how you can process work in motion, cut down idle time, and assure safe handling of product. Work can be done at comfortable heights—worker fatigue lessened—heavy loads eliminated—and damage to product reduced.

Let American MonoRail Engineers plan your handling. Write for full information today.

AMERICAN MONORAIL

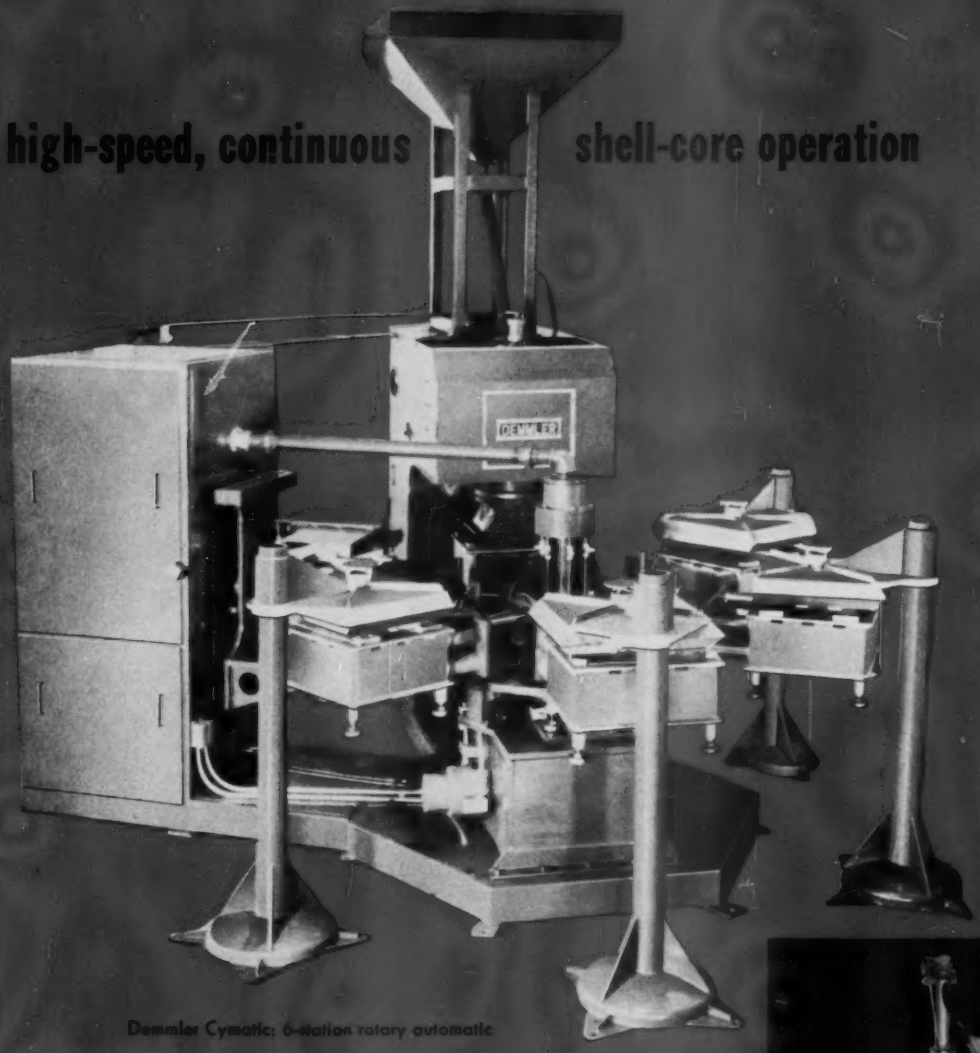
ENGINEERED MATERIALS HANDLING

13104 ATHENS AVENUE
CLEVELAND 7, OHIO

OVERHEAD HANDLING EQUIPMENT

MEMBER OF MATERIALS HANDLING INSTITUTE AND MONORAIL MANUFACTURERS ASSOCIATION

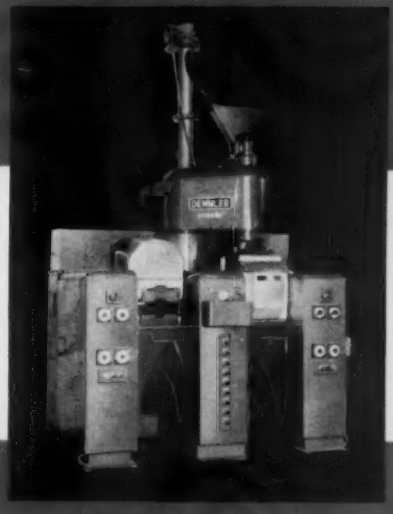
For high-speed, continuous shell-core operation



Demmler Cymatic: 6-station rotary automatic

DEMMLER "CYMATIC"

Precision shell-core equipment with new flexibility, new reliability, minimum investment



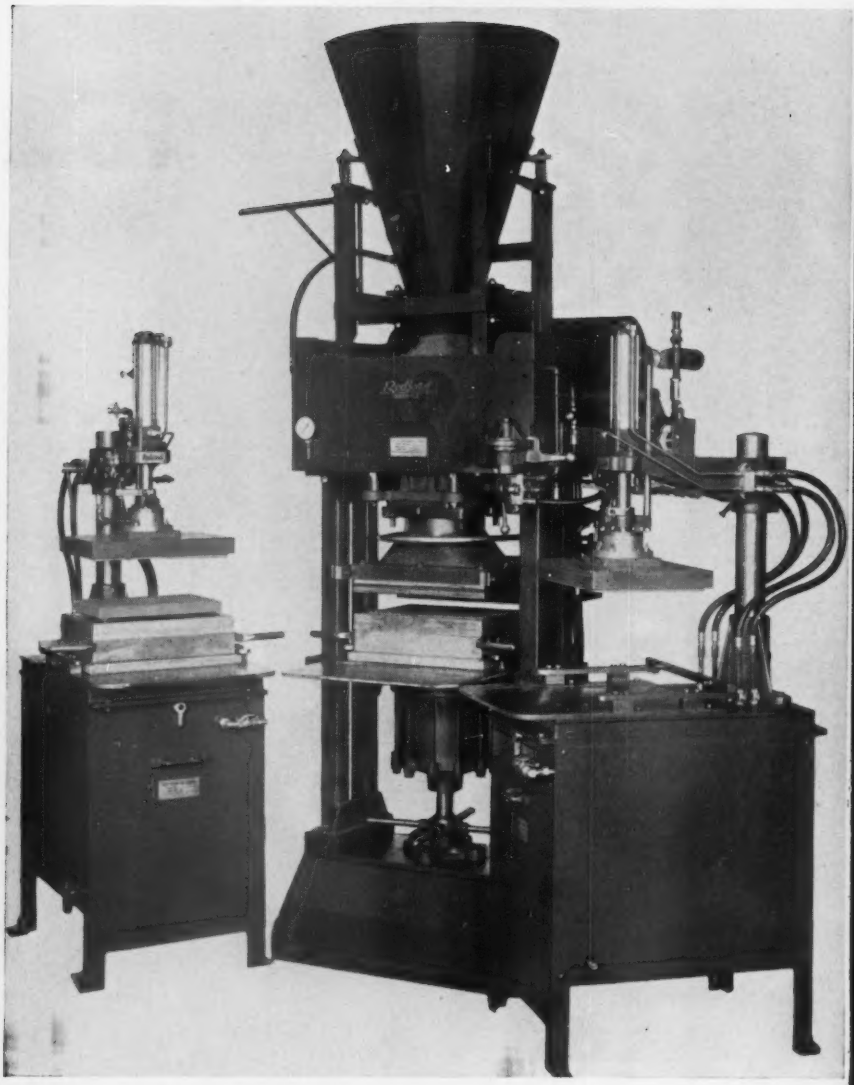
Demmler Cymatic: two-station automatic. Available in single-station models.

- Standardized short-run core boxes
- Standardized long-run core boxes
- Universal, quick-change blow plate
- Quick-change, pre-heated core boxes
- Precision heat-exchange on either half-box
- Vertical down-blow with horizontal and vertical ejection and mandrel draw

DEMMLER MANUFACTURING COMPANY

Kewanee, Illinois

Circle 607 on Page 51



REDFORD CO_2 MOLD MAKING EQUIPMENT

Here is a proven way of applying the CO_2 process to the production of small castings. With the above Redford #420-D Core Blower and (2) Model H-2-M Gassing Stations, one mold is being blown and squeezed while another one is automatically gassed and stripped. Up to 80 complete molds (cope and drag) are produced in one hour. Molds are flat and can be stacked for pouring. Metal yield is greatly increased. Very little floor space is required. Millions of small parts have been cast to close tolerances at reduced costs. For complete information write for BULLETIN No. 421.

Redford IRON & EQUIPMENT CO.
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

TYPICAL CO_2 MOLD CASTINGS

½ Actual Size

FOUNDRYMEN...

who look for quality

*look to...*NATIONAL*

Western BENTONITE

Foundrymen, the world over, make quality their first requirements in bentonite. NATIONAL Western BENTONITE . . . *the product of quality* . . . conforms to these requisites.

There is a good reason . . . NATIONAL Western BENTONITE is a single purpose bentonite produced exclusively for molding sand. It is carefully selected and quality controlled without additions or adulterants from the mine to your foundry.

When greater permeability, unusually good green strength, higher hot strength, plus a higher tensile strength are desired . . . look to NATIONAL Western BENTONITE . . . to supply these factors . . . to comply with the most exacting specifications.

NATIONAL Western BENTONITE is available from better foundry dealers everywhere.

BAROID

BAROID

Baroid Division—National Lead Company

332 South Michigan Avenue, Chicago 4, Illinois

*Trademark Registered U.S. Patent Office

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Alabama—Foundry Service Co., Birmingham. California—Independent Foundry Supply Co., Los Angeles 22—Industrial & Foundry Supply Co., Inc. of California, Oakland. Illinois—American Steel & Supply Co., Chicago 28—John P. Meninger, Elmwood Park—Steelman Sales Company, Chicago 4—Western Materials Company, Chicago 3—Marthens Company, Moline. Massachusetts—Klein-Farris Co., Inc., Boston 11. Michigan—Foundries Materials Company, Coldwater & Detroit—Warner R. Thompson Co., Coldwater & Detroit. Minnesota—Smith-Sharpe Co., Minneapolis. Missouri—Walter A. Zeis, Webster Groves. New Jersey—Asbury Graphite Mills, Inc., Asbury. New York—Combined Supply & Equipment Co., Buffalo 7—G. W. Bryant Core Sands, Inc., McConnellsville. Ohio—The Buckeye Products Company, Cincinnati 16—The Hoffman Foundry Supply Co., Cleveland 13. Oregon—La Grand Industrial Supply Co., Portland 1. Pennsylvania—Pennsylvania Foundry Supply & Sand Co., Philadelphia 24. Tennessee—Robbins & Bohr, Chattanooga 2. Washington—Carl F. Miller & Co., Inc., Seattle 4—Pearson & Smith, Spokane. Wisconsin—Interstate Supply & Equipment Co., Milwaukee 4. Canada—Canadian Foundry Supplies & Equipment, Ltd., Montreal & Toronto.

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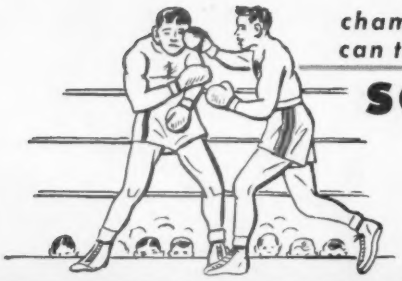

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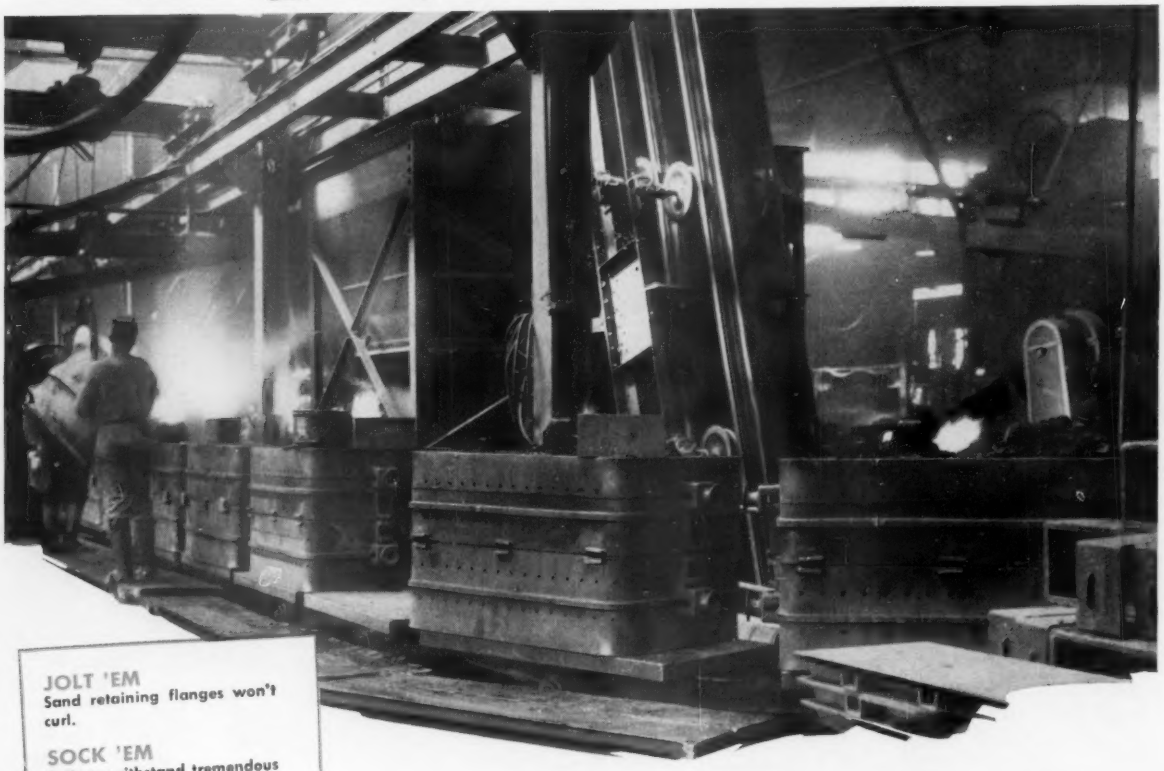

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PIONEERS IN THE MANUFACTURE OF FOUNDRY FLASKS

Circle 610 on Page 51

WHEREVER METALS ARE CAST . . . FOUNDRY

July 1958

Potentials Are There

Foundrymen continue to show great confidence in the potential of their industry.

In spite of keen competition from other forms of fabrication and regardless of the problems created by wars, depressions, and recessions, progressive foundrymen are planning for an expanding market in the future. The chief support for this prospective expansion is the position of the casting process as the cheapest and best method of producing complicated metal shapes.

Faith in the future of the industry is evidenced frequently. The latest demonstration took place in Cleveland a few weeks ago at the Foundry Convention and Show of the American Foundrymen's Society. There a large number of producers of foundry equipment and supplies provided an excellent show which acted as a magnet to draw a good attendance. While some previous shows exceeded the recent one in total registration, the 1958 show was tops in quality.

Interest among those in attendance was high. Operating exhibits drew the largest crowds, but other displays were not neglected by show visitors. Some equipment was purchased, and, even better, many foundrymen indicated that their plans include further purchases. The tone of the show, as revealed by foundrymen and exhibitors, appeared to be one of hopeful optimism.

As foundrymen watched the demonstrations of equipment in operation, or studied the features of machines on the floor, and as they learned about the features of various types of materials for the production of castings, or as they participated in the discussions of the technical program, they seemed to be saying:

"This is a great basic industry with a proud past and a challenging future. To me it offers a splendid opportunity of serving a growing economy, either in times of peace or national emergency. To meet the challenge of the future, my organization must do everything in its power to reduce production costs. We must utilize all available information to improve practices and make a better product. We must tell our customers what we can do to serve them. And we must avoid the temptations of unrealistic price cutting in these times of economic difficulty."

Yes, most of the men at the Cleveland show were looking to the future with confidence and were making plans to be prepared for an improved market when it comes.

Frank G. Steinebach

Editor

Industry Looks To Future at

AFS Congress and Show

THE recent Castings Congress and Foundry Show of the American Foundrymen's Society gave evidence that the foundry industry is looking to the future and preparing for eventual recovery from the recent slow business pace.

This trend toward future planning was evidenced by the keen interest shown in recent developments in foundry operating techniques, equipment, and supplies by the thousands of persons who attended the meeting in Cleveland, May 19-23. It was also apparent in more concrete form in the good volume of sales and inquiries reported by Foundry Show exhibitors.

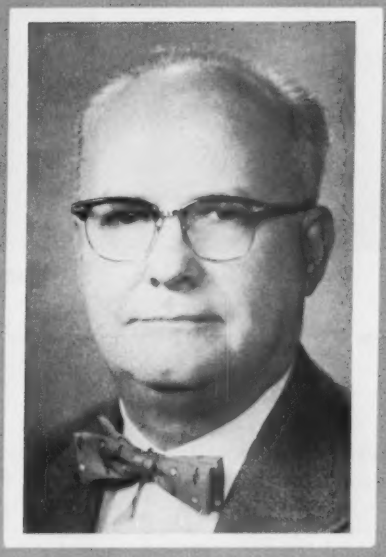
President Harry W. Dietert speaking at the annual business meeting

Attendance at the Congress and Show was down somewhat from levels of recent years, but the announced total registration of nearly 12,500 provided a representative foundry industry audience. Despite the fact that the reduced registration curtailed the attendance at technical meetings, several of the sessions dealing with the newer foundry processes attracted large audiences. Many visitors also took advantage of the opportunity to inspect the various local plants which held openhouse during the week.

Business Meeting—The 61st annual business meeting of the society was the occasion for election of officers and directors and the presentation of apprentice awards, AFS Service Citations, and AFS Awards of Scientific Merit. AFS President Harry W. Dietert, Harry W. Dietert Co., Detroit, presided at the meeting and discussed briefly the highlights of the society's progress during the past year. He referred to the formation of two new divisions—the Ductile Iron Division and Die Casting and Permanent Mold Division—and spoke of the progress made by the recently established Training and Research Institute.

The 1959 AFS Congress is scheduled for April 13-17 at the Hotels Sherman and Morrison in Chicago. In addition to the usual technical program, the society plans to hold an Engineered Castings Show for exhibits by producers of castings. The

LEWIS H. DURDIN
President



CHARLES E. NELSON
Vice President

first show of this type was held during the annual meeting in Cincinnati last year.

Officers and Directors—Election of new officers and directors of the society was announced by William W. Maloney, general manager.

L. H. Durdin, vice president of the society last year, succeeds Mr. Dietert as president. Since 1946, when he joined the company, Mr. Durdin has been president of Dixie Bronze Co., Birmingham. He was graduated from University of Illinois and, following studies at Babson Institute, he joined Chicago Pump Co., Chicago. Later he was associated with Joy Mfg. Co., Pittsburgh, and Line Material Co., Birmingham. Mr. Durdin is a past president of the Non-Ferrous Founders' Society.

Charles E. Nelson, elected vice president, is technical director, Magnesium Div., Dow Chemical Co., Midland, Mich. A graduate of Alma College, before joining Dow in 1930 he was associated with Chevrolet Motor Co., Flint, Mich., and E. I. duPont Experimental Station, Wilmington, Del. He became chief of the metallurgical staff at Dow in 1937, assistant director of metallurgical research in 1941, and technical director of the Magnesium Division in 1946. He was elected a director of the AFS three years ago.

Harry W. Dietert, retiring president of the society, becomes a director for one year. Directors elected for three years are:

David W. Boyd, vice president-general manager, Engineering Castings Inc., Marshall, Mich. He was graduated from Michigan State University in 1939, when he joined Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich. In 1946 he became works manager-plant metallurgist of Engineering Castings, assistant general manager in 1955, and vice president-general manager early this year. Mr. Boyd is a former chairman of the Central Michigan Chapter of AFS.

Thomas W. Curry, director of research, Lynchburg Foundry Co., Lynchburg, Va. Following graduation from Pennsylvania State University in 1932, he was associated with Kennedy Van Saun Mfg. & Engineering Corp., Danville, Pa., and York Corp., York, Pa. He joined Lynchburg Foundry in 1943 and has served as plant metallurgist and director of manufacturing research and methods. Mr. Curry was awarded the Peter L. Simpson Medal of the AFS in 1951.

Richard R. Deas Jr., vice president-works manager, Hamilton Foundry & Machine Co., Hamilton, Ohio. Mr. Deas attended University of Alabama and previously was associated with American Cast Iron Pipe Co., Birmingham, Lester B. Knight & Associates, Chicago, and Hamilton Research & Engineering Corp., Anniston, Ala. Mr. Deas is a former chairman of the Birmingham Chapter of AFS and is an officer of the Cincinnati Chapter.

New AFS Directors

RICHARD R. DEAS JR.

HILLARD M. PATTON

JAKE DEE

Jake Dee, president, Dee Brass Foundry Inc., Houston. He started his foundry career as an apprentice molder for Magnus Co., Houston, in 1922. Later connections include Union Brass Works and Crown Brass Works, Los Angeles, Chicago Brass Works and Ravenswood Brass Works, Chicago, and Southern Brass Co., Houston. He established his own company in 1932. Mr. Dee is a former director of the Non-Ferrous Founders' Society.

Webb L. Kammerer, president, Midvale Mining & Mfg. Co., St. Louis. Following graduation from Washington University in 1916, he joined Warren Steel Casting Co., St. Louis, where he became superintendent. In 1923 he joined the Midvale company and became its president in 1930. Mr. Kammerer is a former chairman of the St. Louis Chapter of the AFS.

Hillard M. Patton, foundry manager, American Hoist & Derrick Co., St. Paul. After graduating from Ohio State University, he joined Ohio Steel Foundry, Lima, Ohio, in 1929. Later he was with American Steel Foundries, Indiana Harbor, Ind., and Superior Steel & Malleable Casting Co., Benton Harbor, Mich. He became foundry superintendent with his present company in 1942 and foundry manager in 1956. Mr. Patton is a former chairman of the Twin City Chapter of AFS.

Clyde A. Sanders, vice president, American Colloid Co., Skokie, Ill., is director-at-large elected by AFS board of directors to serve a three-year term. He was graduated as a ceramic engineer from Ohio State University, and prior to joining American Colloid Co. in 1941, he was associated with Lawrence Clay Co., affiliate of Eastern Clay Products Co., Jackson, Ohio. Long active in AFS technical activities, especially in the Sand Division, Mr. Sanders received the John H. Whiting Gold Medal of the society in 1957.

Apprentice Contest—Mr. Maloney announced that the 1958 Robert E. Kennedy Memorial Apprentice Contest attracted 572 entries from 151 companies. A record number of 18 AFS chapters conducted individual contests prior to the national competition. First, second and third place winners, respectively, in the five divisions of the contest are as follows:

Wood Patternmaking—Adam J. Kravetz, Progress Pattern Co., Pontiac, Mich.; Gerald Celk, John C. Beuse Patterns, Los Angeles; Edward Lamparyk, Modern Pattern Co., Cleveland.

Metal Patternmaking—Paul Niebur, Central Pattern Co., St. Louis; Clifford H. Duckworth, Caterpillar Tractor Co., Peoria, Ill.; Maurice Klante, R. A. Nelson Pattern Works, Milwaukee.

Iron Molding—R. J. McDermott, Brown & Sharpe Mfg. Co., Providence, R. I.; James M. Sanders, Fairbanks, Morse & Co., Beloit, Wis.; Leslie L. Lowe, Caterpillar Tractor Co., Peoria, Ill.

Steel Molding—James E. Gift Jr., Dodge Steel Co., Philadelphia; James C. Rogers, Oregon Steel Foundry Co., Portland, Oreg.; Gordon Wambold, Waukesha Foundry Co., Waukesha, Wis.

Nonferrous Molding—William C. Boatright, Airesearch Mfg. Co., Los Angeles; Loring E. Thomas, Airesearch Mfg. Co., Los Angeles; Ralph E. Leland, Alloy Aluminum Foundry, Los Angeles.

First and second place winners were guests of the AFS at the Congress to receive their cash awards and certificates in person. Presentations were made by Ralph E. Betterley, AFS education director. Also present to receive an award was Naaman Peterson, Puget Sound Naval Shipyard, Bremerton, Wash., first prize winner in nonferrous molding in 1957 who was prevented from attending last year's Congress because of military service.

A report on the successful start of the society's new training courses was presented by S. C. Massari, AFS technical director. The eight courses held last year by the Training and Research Institute enrolled about 400 men from industry. Seventeen courses are scheduled for 1958 and enrollment to date totals 550 students.

Awards—Presentation of Service Citations and Awards of Scientific Merit concluded the business

DAVID W. BOYD

WEBB L. KAMMERER

THOMAS W. CURRY

CLYDE A. SANDERS

meeting. As chairman of the Board of Awards, E. W. Horlebein, president, Gibson & Kirk Co., Baltimore, made these presentations:

Service Citations—Frank S. Brewster, director of research and development, Brumley-Donaldson Co., South Gate, Calif.; Ernest T. Kindt, president, Kindt-Collins Co., Cleveland; Frederick G. Sefing, metallurgist, Research and Development Div., International Nickel Co., New York.

Scientific Merit—Mervin H. Horton, supervisor of foundry service, Deere & Co., Moline, Ill.; Kenneth H. Priestly, president, Vassar Electroloy Products Inc., Vassar, Mich.; Franklin B. Rote, technical director, Albion Malleable Iron Co., Albion, Mich.

Hoyt Lecture—Versatility of silicon as an important material in numerous industries was discussed by Walter E. Remmers, vice president, Union Carbide Corp., New York, in presenting the Charles Edgar Hoyt Memorial Lecture on the subject "Silicon—Present and Future." One of the most common and most useful elements, silicon plays a fundamental role in man's existence, he pointed out, and appears destined to find additional important applications in the metallurgical and other industries in the future.

In tracing the history of the uses of silicon, Mr. Remmers discussed its application as ferrosilicon in steelmaking, as a reducing agent in the production of ferroalloys, as an important alloy of gray

Part of the audience of 660 which attended the annual AFS banquet at the Statler Hotel. Principal speaker was Dr. Ralph E. Lapp, Arlington, Va.

iron, as an inoculating agent in the production of high-strength irons, as a boron-containing ferrosilicon to accelerate malleable iron annealing, and in the production of aluminum alloys for castings.

Foundries find other uses for silicon in silicon-carbide abrasives, in ethyl silicate for investment casting molding material, and in silicone release agents for shell molding. Silicones also have proved useful in high-temperature lubricants. Among other applications the speaker referred to the use of silicon crystals in transistors where they provide higher power levels than does germanium.

Annual Banquet—Mr. Dietert presided at the society's annual banquet May 21 at Statler Hotel with 660 attending. He introduced E. W. Horlebein, AFS Board of Awards chairman, who presented AFS medals to three society members: Ralph A. Clark, Electro Metallurgical Co., division of Union Carbide Corp., Cleveland, the Thomas W. Pangborn Gold Medal; Howard J. Rowe, Aluminum Co. of America, Pittsburgh, the William H. McFadden Gold Medal; and William W. Maloney, AFS, the Joseph S. Seaman Gold Medal. Mr. Horlebein also awarded an honorary life membership in AFS to Mr. Dietert, retiring society president.

The banquet speaker, Dr. Ralph E. Lapp, director, Nuclear Science Service, Arlington, Va., spoke on **Men, Rockets, and Atoms**. He pointed to the danger faced by the United States from nuclear warhead-equipped intercontinental ballistics missiles in the event of war. Such missiles have a high degree of accuracy, and we are within an hour's striking distance of any enemy. Defense against missiles is difficult and, to Dr. Lapp's knowledge, no satisfactory method of interception has been developed.

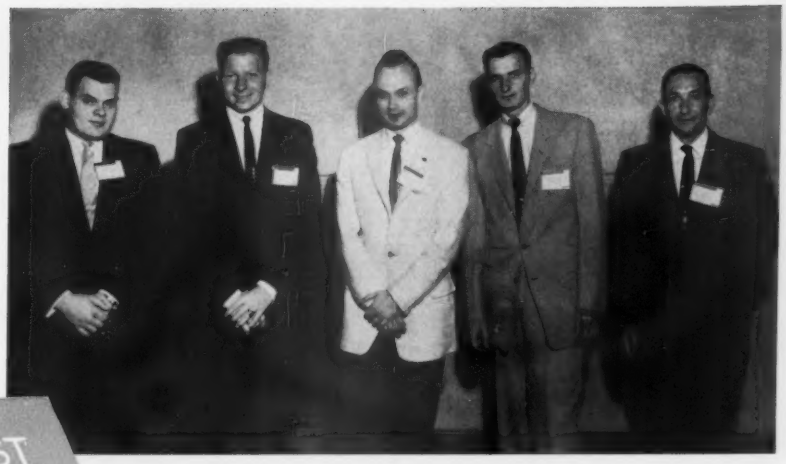
Use of nuclear energy for generation of electricity will take several years before it becomes competitive with coal. Scientists now are working on nuclear techniques which do not produce the radiation dangers of fission. It is hoped that fusion reactions can be contained in a "bottle" of magnetic lines of force and the energy controlled and directed to useful purposes.

Alumni Dinner—The Annual Alumni dinner gave past and present officers and directors, medalists, and honorary life members an opportunity to renew acquaintanceships. Immediate past president Frank W. Shipley, Caterpillar Tractor Co., Peoria, Ill., presided. At the head table were a number of men who have served the society as president, including the oldest past president in point of service, Wyndham R. Bean, consultant, Whiting Corp., Staunton, Va., who served two terms, 1920-22, and the second oldest past president, Dr. Guilliam H. Clamer, president, Ajax Engineering Corp., Philadelphia, who served in 1923-24. Dan M. Avey, former editor of FOUNDRY, the only other past president who served two terms (1934-36), also was present at the head table.

Reports on technical papers presented at the Cleveland Congress start on Page 168 of this issue.

Recipients of awards made at the AFS annual business meeting. E. W. Horlebein, left, Board of Awards chairman, made the presentations to, left to right, Mervin H. Horton, Ernest T. Kindt, Frank S. Brewster, Kenneth H. Priestley, Franklin B. Rote, and Frederick G. Sefing

First-prize apprentice winners, left to right: Adam J. Kravetz, Paul Niebur, R. J. McDermott, James E. Gift Jr., and William Boatright



Second-place winners included, left to right, L. E. Thomas, James Sanders, Clifford Duckworth, and J. C. Rogers. Gerald Celk, another second-place winner, is missing from the photo

Interest Runs High at

AFS FOUNDRY SHOW

EXHIBITORS at the AFS Foundry Show in Cleveland drew an interested audience of foundrymen to the products they displayed—many of which represented new developments in castings production facilities.

General satisfaction was expressed by exhibitors over the buying interest shown by numerous visitors; they feel that this attitude points to an early upturn from recent low levels of equipment demand.

The fact that many machines were in operation helped to attract attention, and the working displays were well distributed throughout the exhibit area of the auditorium.

As a whole, the equipment that was shown reflected the trend toward more automatic operation, higher production rates, and growing application of the relatively new foundry materials and operating practices. In brief, pushbutton-controls have become commonplace, and foundrymen have a wider choice than ever before of sand preparation, molding, coremaking, melting, and cleaning equipment from which to choose. This situation applies to the sand foundry as well as to those using the shell molding or carbon dioxide processes.

Shell Process—Exhibits of machines for making resin-bonded shell molds and cores indicated opposing trends in machine development. Mechanical refinements to complete automation for high-speed production are evident on one hand. On the other, simple, manual or semiautomatic units are being offered for the short-run, jobbing shop. A continuously cycling hollow coreblower typified the automatic units. It blows, drains, cures, and removes cores to a bench or conveyor with no manual operation involved.

Shown for the first time was an extrusion machine for producing resin-bonded sand cores in round, rectangular, angular, and other shapes in any length. A machine for applying liquid bonding agent to mold halves was another first. It is a rectangular unit with 1794 nozzles through which droplets of resin are squeezed by any desired number of plungers.

Sand coating machines shown by several manufacturers supported the belief that use of liquid resin-coated sand will become almost universal. Some of them were using single-stage, water-borne resins in the coating process. A number of suppliers not already offering such resins are developing them for early sale. One of the advantages claimed is elimination of the hazard of using alcohol as a catalyst.

CO_2 Process—Impact on the foundry industry of the CO_2 process for hardening sodium-silicate-bonded cores and molds was indicated by the presence of a dozen and a half exhibits devoted to it either wholly or in part. These exhibits covered the whole range of materials and equipment in-

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volved in the process, including binders, washes, pastes, core and mold blowers, molding machines, coreshooters, mixers, gassing machines and accessory gassing equipment, and liquid, gaseous, and solid carbon dioxide.

A number of exhibits were devoted entirely to various aspects of the process. One of them showed coreshooters, mixers of various capacities, automatic gassing equipment, and binders. At this exhibit cores were shot on the coreshooter and gassed on the gassing device.

Another exhibit drew considerable attention with a setup for automatically blowing, squeezing, and gassing molds or cores on a 15-second cycle. This unit went through the motions of the production cycle, as did a CO_2 molding machine in still another exhibit.

A close counterpart to the CO_2 and shell molding processes was introduced by one supplier. It employs a new type of resin and a chemically reactive gas to bond the coated sand quickly into a rigid mass, and may be used to make either molds or cores in solid or shell form.

Melting—New development in melting equipment is application of 180-cycle electric power in the induction melting field. The units are between the line-frequency or 60 cps type and the 960 to 3000 cps high-frequency types. Instead of motor-generator units for supplying power, the new equipment employs transformer-type frequency changers which are reported to be one-fourth to one-third lower in cost. Two newcomers to the induction melting equipment field were noted. Use of electric resistance heating in a large aluminum holding furnace with automatic ladling also was observed.

One exhibitor used a closed television circuit in co-operation with a local foundry to show its water-cooled cupola melting and allied equipment in operation. Another displayed a 60-in. tapered-shell cupola with a film of water flowing down the sides to demonstrate one method of cooling. Melting of 50-lb heats of aluminum alloy in a small gas-fired, reverberatory type furnace was carried on by one manufacturer to show capabilities of this type of melting unit. A new type direct-fired heat exchanger for preheating the cupola blast also was displayed.

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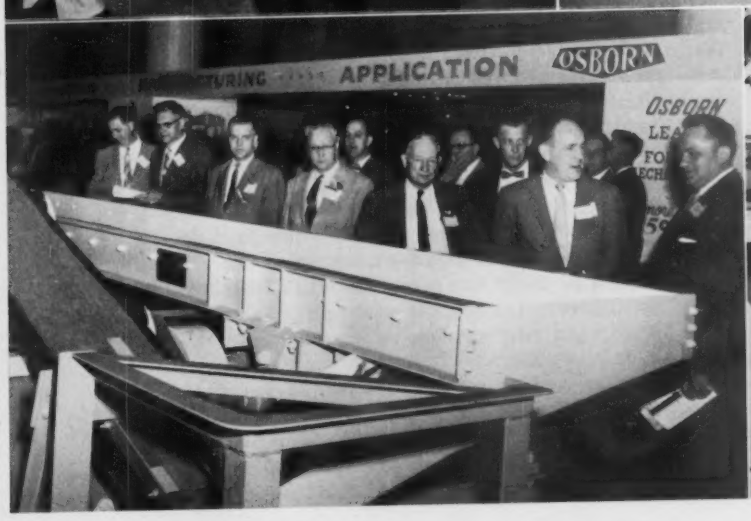

APPLICATION
OSBORN

Steps To Take in ELIMINATING

HOT TEARS

Corrective actions required to avoid hot tears in a problem casting included use of wood flour, multiple gating, external chills, staggering of ribs, and changing carbon content

THIS article relates our experience with a casting which involves almost every corrective action known to eliminate hot tears.

This casting weighs 27,000 lb. It is 7 ft wide, 18 ft long, and the highest rib, which is in the center, is 22 in. high. The casting is known as a press platen and is used in aircraft plants.

Our engineering department had the responsibility for the design from a stress standpoint which was to be approved by the customer. Our engineers cooperated fully with the foundry by staggering the ribs to avoid excessive hot spots, and thickness of the ribs was approved by the foundry. The ribs are 1 in. thick. The bottom of the plate is 1 in. thick plus ¾ in. finish.

Large Cores Involved—This job was a core assembly involving 20 large cores set in a pit 16 x 20 ft. Since we receive orders for six castings at a time, we set the cores on a concrete slab, the slab being tilted to about 10 degrees to accommodate our method of pouring this type of casting. The gate is down, and we pour uphill in order not to cover the entire drag with metal as it enters. This method protects the cope from spalling since it does not receive all the heat over the entire surface at one time.

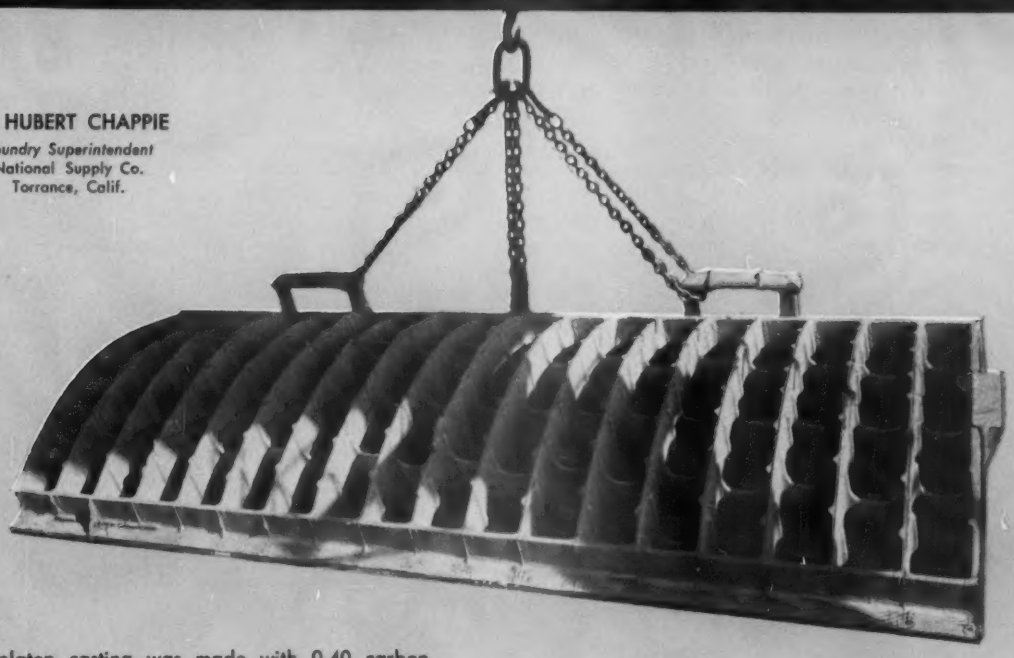
Shrinkage allowance used was ⅛ in. per foot, and all fillets were 1 in. After the first piece had been cast, the shrinkage was corrected to 3/16 in. per foot at the gate side, and ⅛ in. was used at the opposite side. We now use gages to check every core when it is placed in position in the pit.

Originally we started out to pour this job at 2950° F, realizing that the metal had a long way to run, but we learned that we could pour at 2850° with satisfactory results. Our experience has shown, in pouring of large castings, that the colder we pour, the fewer cracks occur. This practice also prevents sand from burning in on the surfaces.

Cold vs. Hot—Pouring with the coldest possible metal definitely reduces cracks, although this point applies only to large castings; we all know that small castings must be poured hotter in order to run. Although a large casting could be poured so cold as to become wavy, we do not sacrifice the eye appeal of a smooth casting. From a usable standpoint, the waviness of the metal would not have any effect; we feel, however, that we should pour as cold as possible, but not to the extent of creating a coldshut. We pour this casting with a 3-in. nozzle.

Effect of Sand—The effect of sand used on a casting of this type is all important in reducing

By HUBERT CHAPPIE
Foundry Superintendent
National Supply Co.
Torrance, Calif.



Press platen casting was made with 0.40 carbon

cracks. On the first casting we used a 12 per cent silica flour sand on the surfaces of the pockets, then backed up the sand with wood flour. The results—terrific cracks at all ribs—were far from pleasing. We therefore changed our practice to use a sand with wood flour, a step which reduced the cracks considerably. With this sand, there was more penetration, but as we reduced our pouring temperature, the penetration lessened.

The combination of silica flour in the sand promotes expansion. Although this was backed up with a sand containing wood flour, not enough heat was generated in the sand to penetrate the wood flour and promote collapsibility. The combination of zircon or silica flour sand works very well with wood flour sand provided that the metal thickness is sufficient to generate enough heat to allow the wood flour to absorb the expansion. The sand with the silica flour has high expansion, whereas the wood flour absorbs the expansion. The wood flour sand was not used nearest the gate since the metal is the hottest at that point and this type of sand causes sand penetration. A silica flour sand was used at surfaces nearest the gate.

Core Rods—At this time it would be well to mention the effect of core rods in the sand. Both the rods used in the cores and the gaggers used in the cope promote cracks, since they expand upon heating. At 1200° F, the rods expand 1/10 in. per ft. They sometimes become heated to higher than 1200° F. The number of rods in a core is the sole responsibility of the coreroom foreman, who must check regularly with his coremakers to avoid excessive use of rods. Usually it is customary to overrod any large core because no coremaker—or core foreman, for that matter—wants to lose a core. Because of the cracking possibilities, however, the overrodding of cores should be watched constantly.

Thickness of Gate—This casting has eight gate contacts and has a 5 in. downgate to accommodate a 3 in. nozzle. Thickness of the gate in relation to the contact thickness of the casting is important to eliminate cracks. Usually we find that when the gate is heavier than the casting thickness, the casting will have cracks at contact. Also, a concentration of heat at gates as a result of using one or two contacts on large castings causes cracks; these cracks would be avoided if the heat is spread over eight contacts.

If cracks are found near the gate, they can be eliminated by repositioning the gate. Here again the concentrated hot metal from the gate is the

cause. At the gate side of the casting, 1-in., round chills 6 in. long were placed at corner of the castings, thereby eliminating the cracks. External chills made of copper, steel, or graphite are very effective in eliminating cracks.

All of the foregoing practices helped to improve the casting and reduce the cracks, but the clincher really was in raising the carbon from 0.23 to 0.40 per cent. Up to this time we were still spending approximately 20 hours of welding on each casting because of cracks. To our amazement, the first platen poured with 0.40 carbon had no cracks. If one finds this hard to believe, we will move over; he is in our class.

Our own research department informs us that a 0.40 carbon would have less cracking that a 0.20 carbon. It also qualifies this, saying that it depends on the design. We can attest to this qualification since we tried the higher level with other castings which are subject to cracks and had no improvement. However, that should not deter anyone from raising the carbon to lessen cracks. If the occasional casting has fewer cracks, it is well worthwhile. Of course, there are times when specifications do not permit this latitude.

In making the last six castings with 0.40 carbon, we had a total welding time of 7¼ hours. Three castings had no welding. Very little time of the 7¼ hours was devoted to welding for cracks; most of it was used to cut a head low. This average of a little over one hour of welding time per piece compares with 50 hours each which was required on the first three castings.

Summary—In reviewing our results on this job (we have made 18 castings), we find that we have incorporated the following practices which research tells us can reduce or eliminate cracks:

1. Using a sand which absorbs expansion (wood flour).
2. Multiple gating of correct thickness.
3. Use of external 1 x 6 in. chills.
4. Favorable design (staggered ribs).
5. Most favorable carbon (0.40) to eliminate cracks.

As related, on the first three castings we averaged 50 welding hours per piece. The last six castings required only a little over 1 hour per piece.

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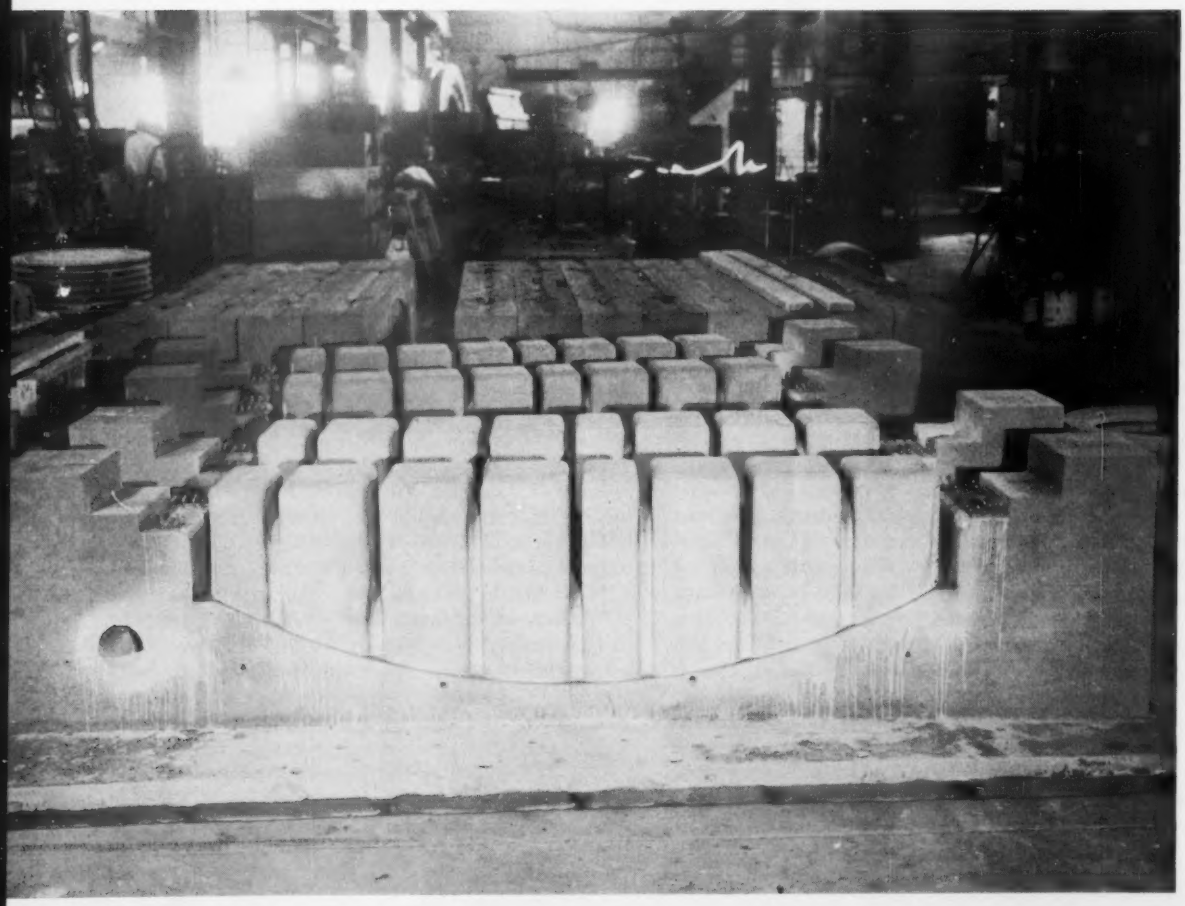
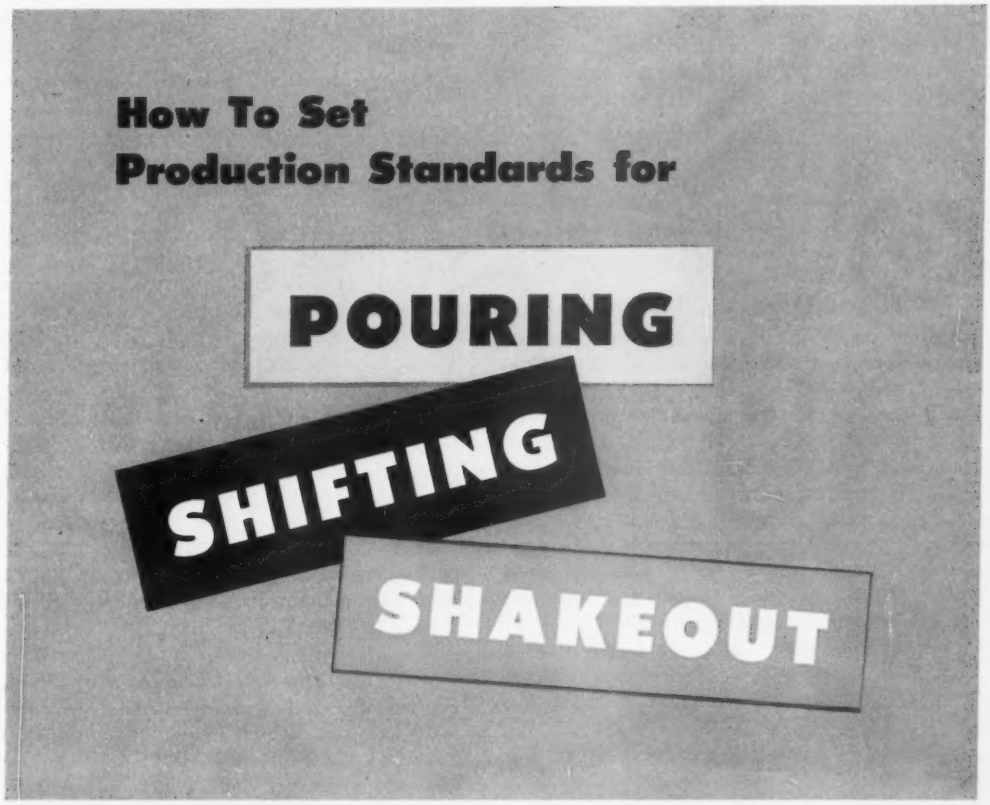
Over-rodding had to be avoided in cores for metal-bonding press platen





This article describes a simple, accurate, and inexpensive method of setting production standards for pouring, shifting, and shakeout operations. Earnings are computed in one minute per operator

By J. E. KEITH
Industrial Engineer

ALTHOUGH pouring, shifting, and shakeout are obviously direct labor operations, it has long been traditional in the foundry industry to lump these costs into burden. The venerable adage is: "You can't put these operations on standard." Thousands of small and not-so-small foundries still venerate the adage. In so doing, they tolerate a falsification of their costs and a low level of productivity on these operations.

It's Expensive—In the modern foundry, many of the reasons that originally lay behind the above adage are—or ought to be—now obsolete, but one of them remains wholly valid—namely, cost. An average figure often quoted for the cost of work measurement is two engineering manhours per time study. In even the small foundry, pouring, shifting, and shakeout can total many thousands of operations. To get standards on these operations by conventional stop-watch time study costs money.

There have been only two significant innovations in work measurement since the time study was invented three generations ago. Both have come in recent years. One is the proprietary system, like Work Factor or MTM, based on micromotion studies in the laboratory. Certain advantages these offer have won them increasing acceptance, but few users report savings in the cost of rate-setting, for each individual operation requires a minutely detailed methods analysis.

The second innovation—the use of elemental standard data compiled from many time studies of related operations—*is* a time saver. Some folks claim a productivity, on certain operations, of five to ten standards per engineering manhour by this method. But there is a catch in this. It comes right at the beginning, as in the recipe for rabbit stew:

"First, catch your data." The data used in *your* plant must accurately reflect the individual peculiarities of *your* operation. You can't buy such data. You have to develop your own. In even the small plant, the development of comprehensive standard data usually takes thousands of engineering manhours.

Faced in these terms, the prospect of getting standards in the small foundry looks hopeless. Faced in these terms, it *is* hopeless. So let's face it in different terms. If conventional methods won't do the job, can we do any good by flouting convention? The answer is yes.

The technique to be described embodies nothing intrinsically new. It combines a standard data approach, sampling, and a much older dodge whose secret—if it has any secret—lies in finding ways of classifying items in the process and the product line that will point out basic identities and similarities between them. When revealed, such identities and similarities sometimes permit a single time study to establish a whole group of job standards, or to serve as the basis for a whole group of related standards. The technique has so rarely been employed in a systematic and ambitious manner that it doesn't even seem to have a name. We might call it—for want of something better—the Wholesale Method Of Work Measurement. The technical details of the case history that follows are intended to make this method clear.

East Jordan Iron Works, East Jordan, Mich., was founded in 1881. Today the sons and grandsons of the founder have a modern plant pouring 75-90 tons on an average day with 175 employees. Until recently, one of the company's headaches was how to get incentive standards on approximately 12,000 pouring, shifting, and shakeout operations. The firm's product line includes about 5000 items, all of which have to be poured and shaken out. Some 2000 of these castings are poured in snap flasks and require an added operation for shifting jackets and weights.

The 12,000 standards, with the exception of one minor group, went into effect last year. Six weeks later a nine-man pour-shift crew was doing the work that had previously taken 16 to 18 men. The shakeout crew, which had formerly averaged 400-450 molds per shift, was consistently hitting 700-750. In addition, daily overtime on these operations, which had been habitual, was reduced drastically. The job of establishing the standards took a bit over 300 engineering manhours—one man, two months. This is how it was done:

Classification by Weight—The manner of attack was suggested by the commonest of all methods of classifying castings—that is, by weight. It was assumed that a reasonably fixed relationship exists between casting weight and the work content of the pouring and shakeout operations, and that this relationship could be established and used as the basis for production standards. It might be added that while work on these operations was in progress it became evident that a similar attack on the cleaning operations (rattler and airless blast) was probably feasible and, later, it proved possible to establish nearly 10,000 job standards in the cleaning room at an expenditure of about 125 engineering manhours.

Pouring—In theory, the time required to pour a mold is a direct function of the quantity of iron poured. This can be made true in practice if the gating system automatically delivers iron at the fastest rate possible without damage to the mold, thus relieving the pourer of any responsibility except that of keeping the pouring basin full. Unfortunately, gating practice in most foundries is not fully up to this ideal. Worse yet, casting gross weights are rarely recorded so that it is necessary to correlate pour time to the weight of the finished casting. These facts suggest the possibility of serious discrepancies in pour time.

One simple check was possible. From yield and scrap records an average percentage of casting net weight for sprues, gates, and risers was established and a chart made up of theoretical molds-per-ladle. (Most of the iron in this foundry is poured from 1400-lb ladles, transported from cupolas to floor by lift truck.) Systematic checking disclosed no discrepancies greater than one mold out of seven per ladle or two out of fourteen.

Actually, this problem of discrepancies in pour time is less serious than appears at first glance. For example, it had to be assumed that about 250 lb of iron was poured to produce a 225-lb casting. Suppose a given mold actually took 300 lb? That's an apparent discrepancy of 20 per cent which, if not intolerable, is certainly undesirable. But the tables of recommended pour times give 17 seconds for 250 lb and 18 seconds for 300 lb. The discrepancy is actually only 5.9 per cent, which is less than the allowable margin of error in a time study.

In this foundry most miscellaneous small castings (1 to 30 lb) are squeeze molded on two identical floors, and poured from 500-lb ladles manually hauled from the cupola by monorail. This whole operation—after molding—was combined for a two-man team. It was immediately obvious that the only variable in the operation was pour time. Within the range of flask sizes involved—144 to 192 sq in.—there was no significant variation in the times required to perform the other elements, which included moving the ladle between pours, shifting jackets and weights, dumping the poured molds off the conveyors, and returning bottom boards to the molders.

Hauling iron from the cupola also was an unvarying element which merely had to be prorated over the number of molds poured per ladle. Allowed times for these fixed elements were established quickly by time study. Repeated snap back studies were then made of the pouring. The resulting elemental times were plotted against casting weight, graphed in the usual manner, and allowed pour times taken from the resulting curve. Standards were issued in increments of 1 lb up to 10 lb and 2½ lb from 10 to 30 lb.

This move established several hundred job standards and got most of the small stuff out of the way.

FLOOR NO. _____ TIME PER MOVE _____ LADLE TIME _____

WEIGHT OF CASTING	MOLDS PER LADLE	POUR TIME PER MOLD	MOVE TIME PER MOLD	LADLE TIME PER MOLD	TOTAL TIME PER MOLD	ALLOWANCES %	STD. TIME PER MOLD	MOLDS PER HOUR	MAN HOURS PER MOLD

Fig. 1—This work sheet is used to compute pouring standards

At the same time, the touchy problem of designating pour times for the rest of the product line was being tackled.

Production castings in this foundry range from 1 to 5000 lb, with an occasional custom job up to 20,000 lb. But, apart from small castings, all the high-production items that constitute the backbone of the business are concentrated in the 100-600 lb range. There are only about 20 production castings of more than 1000 lb and only a few score between 600 and 1000 lb, and these are not high-volume items. The range between 100 and 600 lb was the area of primary concern and where pouring time studies were concentrated. They were concerned solely with actual pour time—flow start to flow stop.

When the sampling was completed and graphed it was found, as had been hoped and expected, that the times showed a reasonable consistency. They averaged about 200 per cent higher than the "ideal" pour times in the handbook, but the curve was reasonably consistent with the curve plotted from the recommended pouring tables. This was good enough. To the recommended pouring times 200 per cent was added and from the resulting table allowed pour times were drawn off by interpolation in increments of 5 lb up to 50, 10 lb up to 250, 25 lb up to 500, 50 lb up to 1000, and 100 lb beyond 1000.

With pour times established, the rest of the job offered no serious problems. The following elements were recognized in the pouring operation and allowed times established by time study:

I. *Pick up full ladle with hoist.* On high-production floors stands were erected at approximate pouring height on which full and empty ladles could be set off. On other floors ladles were set off on the ground and added time in this element and Element VI below was allowed to raise or lower the ladle.

II. *Move full ladle onto floor over craneway.* An allowed time per foot of move was established by carefully rating the movement of the ladle over a measured distance. Moving the heavy ladle over the uneven footing of a pouring floor at even slow speed requires much more than a "normal" effort. Rating of such operations as this is very difficult because the rapid movements that usually cue high effort are wholly absent. One simple and effective way to establish the degree of effort involved is for the engineer to get out and wrestle the ladle himself.

The allowed distance varied from floor to floor. It had to be an average distance, of course, and care was taken to make it an actual average, which is not always the distance from the pickup point to the geographical center of the floor. Depending on the co-ordination between molding, pouring, and shakeout, the pourers may consistently work more in certain specific locations on the floor.

III. *Prepare for first pour.* After getting the ladle to approximate location the pourers have to locate the spout accurately at the pouring basin and tilt the ladle.

IV. *Move ladle between pours.* This time varied significantly over the whole range of flask sizes in use, but because the range of sizes on any given mounted floor was limited it was possible to establish a single move time for each floor. In the pouring of floor-molded castings, with a wide variation in flask size and no systematic arrangement of the molds on the floor, the move time allowed was merely a generous estimate of the average move.

It should be noted that the first pour from the full ladle requires no move. Accordingly, Move Time

Per Mold = Allowed Time Per Move x (N − 1) ÷ N when N is the number of molds poured per ladle.

V. *Move out empty ladle.* The comments under Element II apply here.

VI. *Set down empty ladle.*

VII. *Skim slag.*

Allowed times for all the above elements except IV were added together and called Ladle Time. The pouring standards were then computed on work sheets (Fig. 1) whose usage is self-explanatory.

Shifting—Shifting methods in this foundry were erratic and unsystematic. Shifting was done manually or by hoist, and weights and jackets were shifted together or separately at the whim of the operators. In the latter case, while heavy weights were always shifted by hoist, even the larger jackets were often moved by hand. The manual shift from one conveyor to the next is awkward for the two-man team, and the men preferred to shift up and down the same conveyor. In their persistence to do this they often walked and carried over excessive and wasteful distances.

Snap flask sizes ranged from 16 to 36 in. Operations in sizes smaller than 24 in. were insignificant in volume, and no time was wasted on them except to provide some rudimentary training and set a standard. For sizes 24 in. and larger the shifting method was standardized. Where necessary, extensions were welded on weights so that they overlapped even the larger jackets. All shifts are now made by hoist, with jackets and weights shifted together in one pass. All shifts are made directly across from one pouring conveyor to the next, a fixed distance of 4 ft. (By hoist, this shift is not awkward.) The operation is now identical for all shifts on all floors. With the method standardized, jackets in the 24 to 36 in. range were classified as medium or large, with the 30-in. dimension the dividing line, and a standard established for each class by time study.

In this foundry, as in many others, it had always been traditional to have a pouring crew and a shifting crew. Unless the two operations were perfectly synchronized—which rarely happened—the pourers frequently waited for the shifters to shift; then the shifters waited for the pourers to pour.

A substantial saving was effected simply by combining the two operations. Each two-man pouring crew now does its own shifting, and for the purposes of standards and costs the shifting operation is combined with the pouring.

A single chart, listing casting weights down the lefthand margin and floor numbers across the top, provides pouring standards for all molds in tight flasks. A second similar chart lists the pour-and-shift standards for all snap flask items.

Some adjustments were required after these standards went into effect. It was anticipated that pouring standards for a few light castings, molded two to four on, might be tight due to the disproportionate amount of sprue. This turned out to be true. At the same time it developed that in pouring these castings with the 1400-lb ladle, with the pourers doing their own shifting, the iron chilled before the ladle could be emptied. Accordingly, standards in the range from 45 lb downward were adjusted, and also revised for pouring with a half-filled ladle.

Standards for castings of more than 1000 lb were considered tentative only. Experience has shown that certain items in the range down to about 500 lb will also require some adjustment. The commonest contingency that has appeared is that of feeding risers. This is handled by a table of standard allowances which can be added to the basic standard when required. It now appears that in the whole line perhaps 40 or 50 exceptional items will require individual standards.

There have been no complaints of tight standards and no jobs have been "run away with." Average incentive earnings of the pourers have risen steadily and, after four months, were just below the level these standards were intended to produce. In fact, all the pouring teams but one are now at the desired earning level.

Shakeout—The intention to tie shakeout standards to casting weight was abandoned because simpler ways became evident.

The shakeout in this foundry is physically linked to four high-production floors with a bank of 19 pouring and return conveyors. It formerly serviced these floors only. The remaining 13 floors, 6 of them mechanized, were shaken out on the second shift. Molds are now brought to the shakeout from any floor by tractor scoop or lift truck, with an allowed time added to the basic shakeout standard for transporting the mold and returning flask and bottom board to the molders.

Molds at the shakeout immediately classified themselves as snap flask or tight flask. For the former, the bottleneck that determined the productivity of the operation was the transfer of the casting to the cooling conveyor by jib crane. The weight range of snap flask items at the shakeout is about 200 lb. It proved possible to establish four classifications of these castings, based primarily on weight but including certain other factors.

For tight flasks, the nominal bottleneck was the handling of the flask. Two classes were established, one for flasks that can be shaken out in one pass, the second for those with bars in the drag, which makes it necessary to shake out cope and drag separately. For these two classes, the work content varies significantly over the range of flask sizes involved. But because this range is limited on any given mechanized floor it was possible to establish a single standard for each class for each floor.

In practice, only negligible exceptions have turned up. Four exceptionally large flasks from the slinger floor required individual standards. Eight other tight flask items flouted the basis for the tight flask standards—that is, the casting took longer to handle at the shakeout than the flask. Half of these cases were kept on standard by devising a better way of handling the casting. The others were given individual standards.

There has been no trouble at the shakeout with either tight or loose standards. Incentive earnings of the crew reached the anticipated level in about

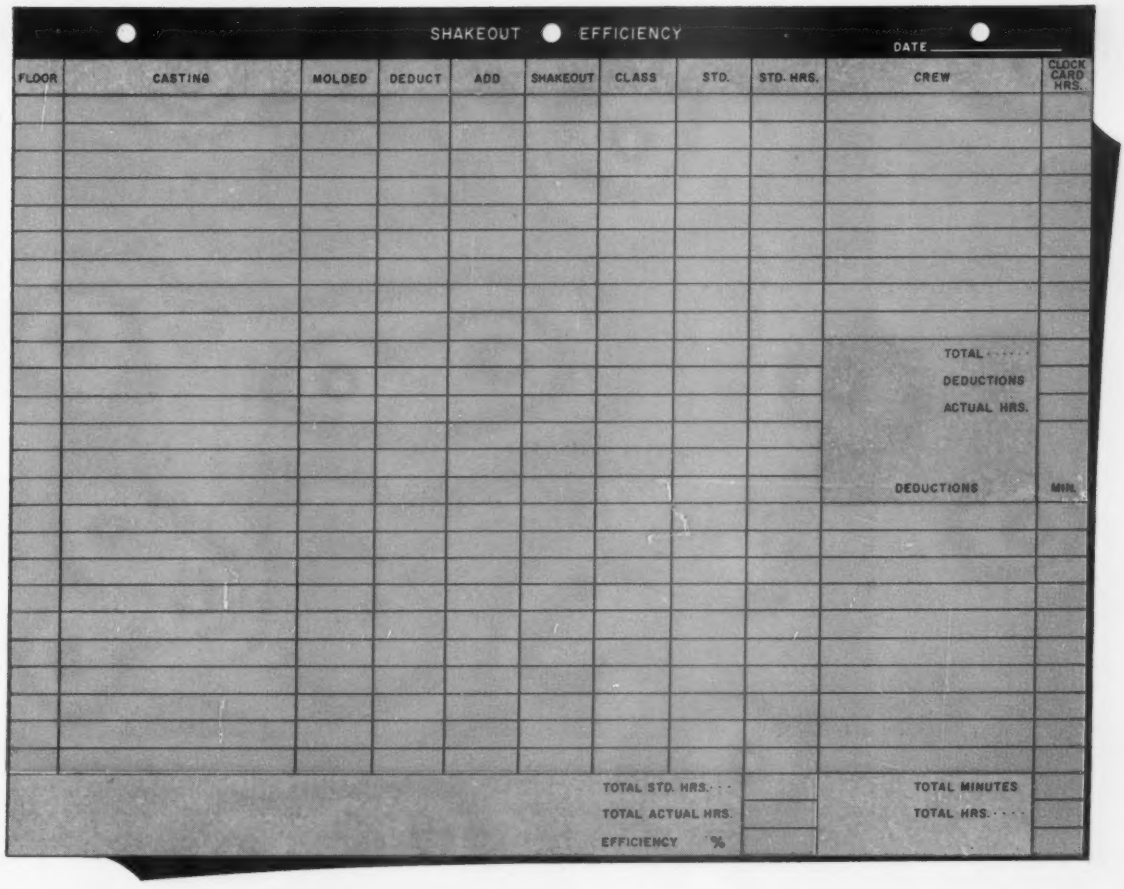


Fig. 2—Shakeout efficiency is computed on this type of form

three months after standards had been set.

Administration Is Inexpensive—A major objective in this standards program was to hold down administrative expense, a bugbear in many standards plans. The timekeeping procedures on these operations illustrate how substantially this expense can sometimes be minimized.

No timekeepers are on the floor, and the pouring and shakeout operators keep no record of their production. Pouring teams indicate the floors they have poured by simply writing the floor numbers on their job tickets. Members of the shakeout crew turn in nothing except their downtime, if any.

At 3 o'clock, when the molders (who do turn in counts) quit work, a clerk promptly collects their job tickets and types up the daily production report, which lists the castings molded floor by floor and includes casting weights. He immediately takes one carbon copy out to the pouring-shakeout foreman, who codes each part number for its shakeout class and, if it is a snap flask item, adds the flask size. At 4 o'clock, when his shift ends, the foreman checks each floor and jots down in columns provided the number of molds, both poured and unpoured, remaining on the floor. These unfinished molds are deducted from the day's pouring and shakeout counts and added on again the following day when the work is completed.

Using this tally sheet, the time clerk locates on his standards chart, by floor number and casting weight (and snap flask size, if it is involved), the pouring standard for each casting. He extends the standard against the corrected production count and posts the standard hours earned on the pourers' job tickets. The efficiency of the pouring team is found, of course, by dividing the total number of standard hours earned by the hours actually worked.

Shakeout efficiency is computed on a special form (Fig. 2) which is self-explanatory. The form is so designed that it can be inserted as a carbon copy when the daily production report is typed, and is imprinted with floor numbers, part numbers and the molders' production counts. All the time clerk has to do is correct the counts, pick the standards off his chart by floor number and shakeout class, and make his calculations.

It takes the clerk about 15 minutes a day to compute the efficiency and incentive earnings of these work groups, an average of less than one minute per operator.

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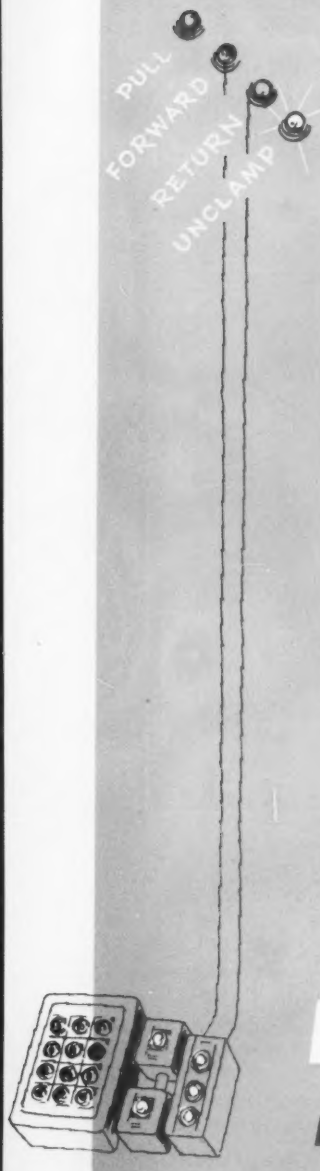
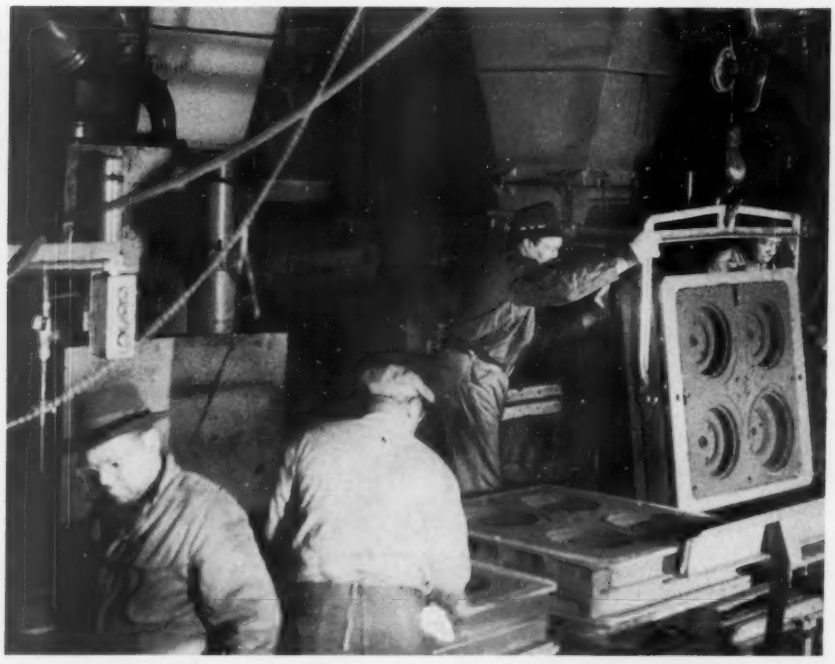




The two men in foreground set stamped steel back plates in brake drum mold cavities. Operator in background moves drag mold from molding machine to car conveyor

Mechanized Molding Line

Produces Gray Iron Brake Drums

Two sets of rubber diaphragm molding machines produce four-cavity molds on a new production line, featuring a high degree of mechanization and drag flasks which may be used either side up

By ROBERT H. HERRMANN
Associate Editor

A new molding line at the air-conditioned Kelsey-Hayes Co. foundry, Detroit, produces gray iron brake drums on two sets of rubber diaphragm molding machines. Three sets of cope and drag machines are incorporated in the line, one of which is kept as a standby.

The new line, recently put into production, is a self contained unit with its own sand preparation equipment. Metal, however, is obtained from cupolas supplying the entire foundry.

Four continuous cycling, automatic mullers prepare molding sand mixes from new and returned sand and slurry of binders. Materials for the slurry include seacoal, southern and western bentonite, and other dry binders delivered to the foundry in bags. The bags are broken over a waist-high grate and the contents fall through a chute to a 4-in. diam air hose which may be connected to any of three, 4-in. diam pipes for delivery pneumatically to three hoppers over two 300-gal capacity mixing tanks. Air-operated gates at the hopper bottoms release the binders to vibrating feeders controlled by timers to deliver a predetermined amount of each to the mixers. Water is metered into the mixers. The entire system operates continuously and automatically.

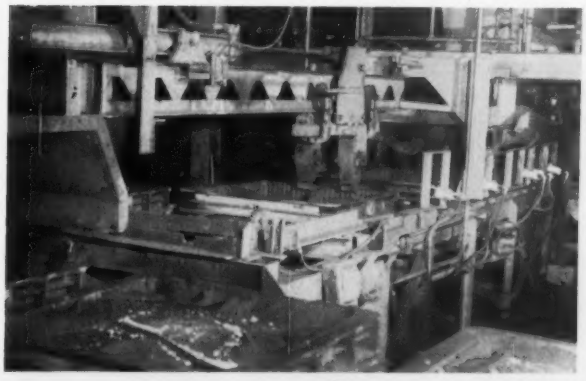
Sand Handling Is Automatic—New sand, delivered to the foundry in gondola cars, is removed by clamshell bucket to a 15-ton bin and is fed by a plate feeder at the bottom to an 8-in. oscillating conveyor for movement across the foundry basement to an inclined belt conveyor. Clean shakeout sand is delivered to the same belt and the mixture conveyed to a bucket elevator which empties onto a second inclined belt. A cross-belt carries the sand to a rotary exhaust screen for removal of foreign material. From the screen, sand falls to an inclined belt for delivery to a bucket elevator which deposits it on a belt running over a magnetic pulley. A final belt carries the sand over four storage bins. Plows controlled by level measuring devices in the bins plow sand off the belt.

Pneumatically-operated gates release sand from storage bins to small, volume-measuring hoppers containing probes to determine sand temperature and moisture content. The probes are connected to an automatic device which determines slurry additions needed to obtain desired sand properties. Slurry then is metered into the mullers, with the sand dumped through pneumatic gates on the measuring hoppers. The desired sand properties are moisture 3.2-3.6 per cent, green strength 14-16 psi, and permeability of 100-200.

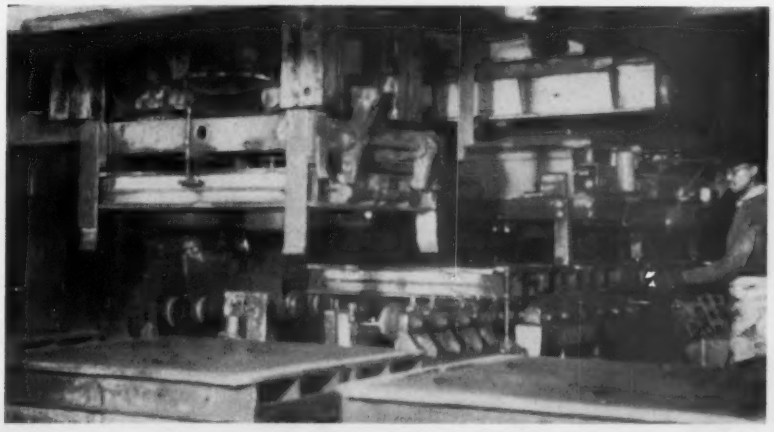
Prepared sand discharged from the four, 2000-lb capacity mullers falls to a common belt conveyor and is moved to a bucket elevator. It dumps the sand on a belt over six hoppers supplying sand to the three cope and three drag molding machines. Here, again, level-indicating probes in the hoppers control the sand plows.

Use Two-Way Drag Flasks—Cast steel flasks, 36 in. square, are used on the line. Each contains a four-cavity mold. Drag flasks may be used either side up, thus eliminating a turnover operation after shakeout. Empty flasks are moved up behind the molding machines by two chain-driven, free roller conveyors—one for copes, one for drags. Limit switches along these conveyors behind each machine actuate flask removal devices. A switch is dead, however, if the machine it serves is not ready for an empty flask.

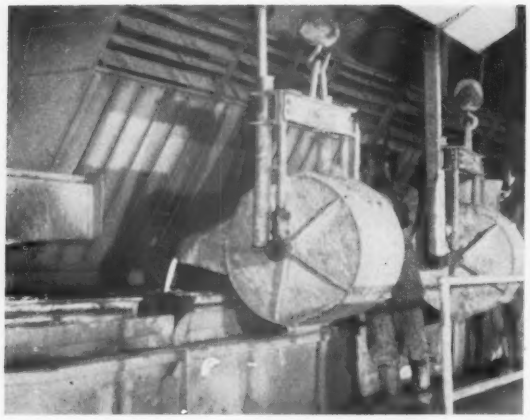
At each drag machine an air-cylinder-operated swinging arm pulls an empty flask from the powered conveyor to a slideway leading to a conveyor exten-



Air cylinder-operated shuttle device pulls cope flask from delivery conveyor to molding machine



Air-operated device grasps, lifts, and carries cope over drag and closes mold. The sequence of operations is controlled by pushbutton



Molds are poured along a compensating air hood, then travel through an exhausted cooling tunnel

sion at each drag machine. An air cylinder shuttle moves the flask off the slideway to the wheel conveyor extension. Arms on an overhead, shuttling, sand measuring hopper move the flask farther along the wheel conveyor. As it moves one flask it pushes others ahead of it. There are four flasks in each machine system at all times.

One by one flasks are pushed over the pattern, which is sprayed with liquid parting as the flask moves into position. When the shuttling sand hopper slides from under the sand supply hopper and over the pattern, a cut-off plate behind the measuring hopper closes off the supply hopper. When the pattern has been raised into the flask, the bottom of the measuring hopper is pulled back by an air cylinder to drop the sand load and fill the flask. The shuttle then moves back for reloading and is in position to push another flask over the pattern.

Filled flask and pattern are moved by air cylinder 90 degrees to their previous line of travel under a metal roller into the diaphragm squeeze machine. The roller levels the sand with the top of the flask. After the squeeze, pattern and flask are returned to their original position and the pattern drawn down. The completed drag is pushed to a wheel conveyor extension by the incoming empty flask.

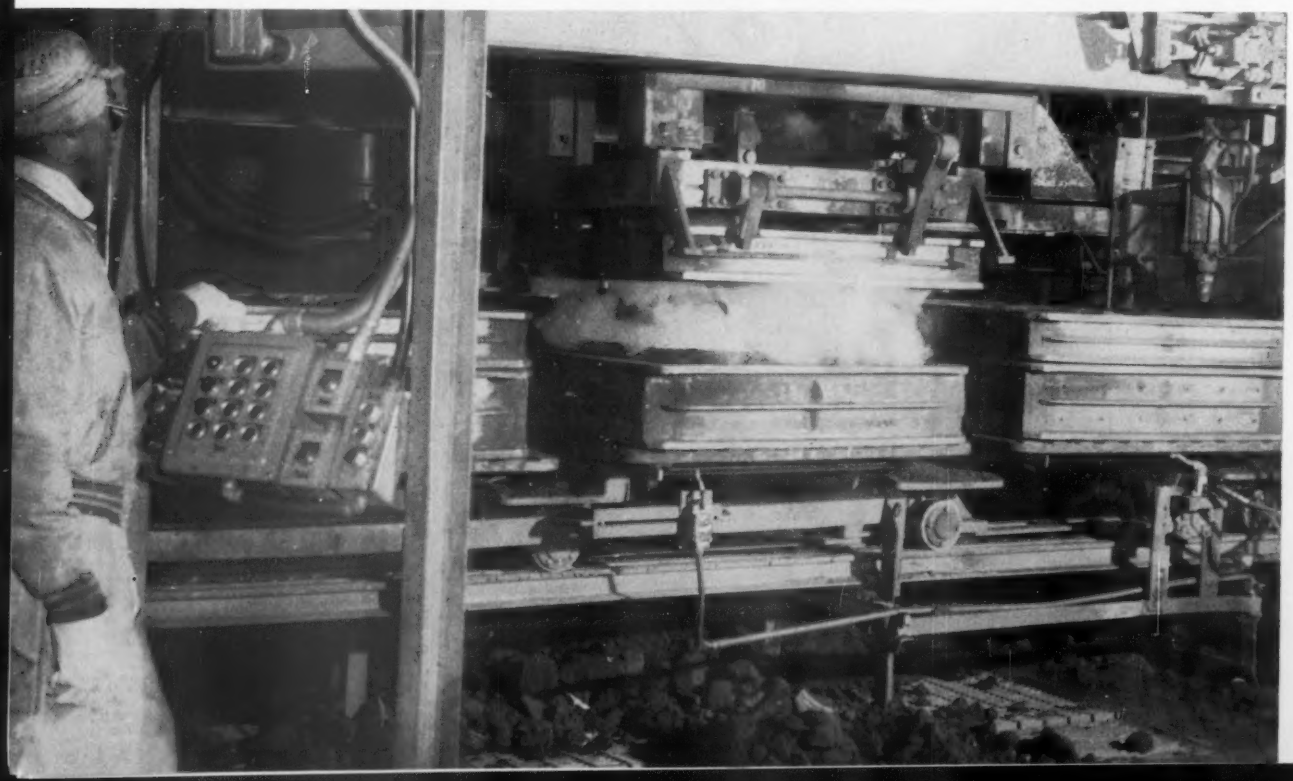
Back Plates Are Cast In—Operators use a hand-clamping bail on an air hoist suspended from a trolley, which rolls on an overhead bridge crane to move molds from the wheel conveyor extension to a car on the mold conveyor. A man is stationed along the car conveyor between the drag and cope machines to set stamped-steel back plates in the four mold cavities. They are cast into the drum.

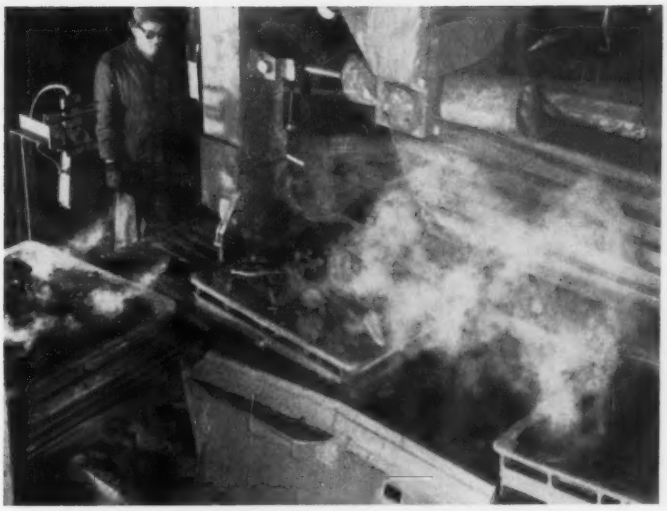
Operation of the cope machines is the same as that of the drags with one exception. Empty flasks are pulled from the chain-driven free roller conveyor by an automatic, air-operated shuttle device to the slideways leading to the cope machine. One man controls lifting of completed copes from the wheel conveyor extension off each machine with a clamping bail suspended from an air hoist. The hoist is mounted on a bridge crane beam. An air cylinder moves the beam between the mold pickup point and the car conveyor. Guides on the bail engage corners of the drag flask on the car conveyor to facilitate aligning the cope over the drag so the mold can be closed quickly.

Molds are poured with gray iron at 2600° F under a compensating air hood with electrically raised, lowered, and propelled ladles. Poured molds enter an exhausted cooling tunnel.

On the back leg of the mold conveyor loop an air

Pushbutton-controlled, air-operated mechanism removes copes to vibrating shakeout





Drags are pushed automatically from car conveyor to shakeout by an air cylinder-operated arm

Operators along oscillating conveyor knock off gating metal and hook drums to chain conveyor

shuttle device lifts the cope off the mold and sets it on a vibrating shakeout. An air cylinder hook pulls the flask off the shakeout to the chain-driven roller conveyor for delivery to the cope machines.

Drags re-enter the cooling tunnel, go around the loop, and are swept off the cars to a vibrating shakeout by a swinging arm moved by an air cylinder. Empty flasks come off the shakeout to a power conveyor; it moves them to the end of another power conveyor which supplies drag molding machines. An air cylinder shuttle device pulls them onto that conveyor.

Shakeout sand is carried on an oscillating pan conveyor, and spill sand from the molding machines is moved by a drag chain pan conveyor to a common belt conveyor. After passing under a magnetic plate, over which a short cross belt passes to remove scrap iron, the sand is dropped onto an inclined belt conveyor for return to the system as described previously.

Castings fall from shakeout to an inclined apron conveyor which feeds a perforated pan oscillating conveyor. Workers along this conveyor knock gating metal off the cast drums. Drums are picked up by hooks on an overhead monorail chain conveyor to be transported outside for cooling and into the cleaning room. Gates go off the end of the apron conveyor to a below-floor-level oscillating pan conveyor to scrap storage.

As the drums enter the cleaning room on the monorail conveyor they are removed manually to a rubber belt. This belt slides on a metal pan and the drum is placed so half of it is on the conveyor and the other half is supported by an angle iron slideway. In this way the drums revolve as they are moved through an airless blast shot chamber and are shot blasted from top to bottom. Drums then are inspected visually and hung on hooks of a monorail chain conveyor which carries them into the machine shop.

Two Cupolas Supply Metal—Two hot blast, water-cooled cupolas lined to 80 in. ID with melting capacity of 35 tons per hour are used on alternate days. Metal charges are made up with a magnet on a bridge crane traversing the storage yard. Cone-bottom buckets rest on a car under a weigh hopper to receive the metal charge. Vibrating feeders at the bottoms of coke and limestone hoppers measure those ingredients into the bucket. The car with its loaded bucket is moved under the charging hoist and is lifted to the charge door. The electric hoist-charger carries the bucket into the cupola along a monorail. The charging mechanism can be swiveled to serve either cupola.

Charges consist of 4000 lb of metal made up of pig iron, briqueted borings, steel scrap, and the balance home scrap. Coke, limestone, silicone, and manganese briquets complete the charge.

Blast air is heated to 600° F in a gas-fired heat exchanger. Metal is tapped continuously at 2800-2825° F into a 5-ton forehearth. Slagging also is continuous through a front spout into a water sluice.

Operator-controlled overhead monorail carriers of 2-ton capacity deliver metal to the molding lines. Metal in the carrier ladle is inoculated with ferrosilicon. Also a wedge chill bar is poured with a sample of metal from every ladle. Chemical tests are performed every 15 minutes. The desired analysis in castings is 3.35-3.65 TC, 1.90-2.10 Si, 0.60-0.90 Mn, 0.12 max S, and 0.12 max P. Properties of the metal are 35,000 psi tensile strength, 1800 lb transverse strength, and 0.17 in. deflection.

Air-Conditioning—Exhausted air from the pouring area, cooling tunnels, and shakeouts is passed through wet collectors before release to the atmosphere. During summer months fresh outside air is brought in through a water cooling tower and blown into the area occupied by the new line. More than 75 per cent of the entire foundry is ventilated and cooled in the same manner.

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The Importance of

CLAY PARTICLE

Clay particle size has important effects on sand properties and characteristics. Investigation of these effects is called for

By WALTER E. GRUVER JR.
Meehanite Metal Corp.
New Rochelle, N. Y.

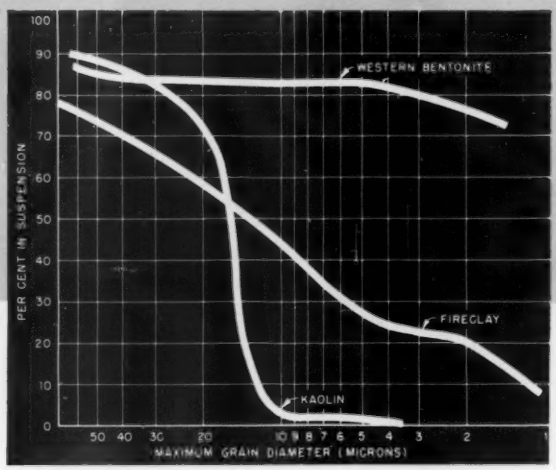

Fig. 1—Results of hydrometer test are plotted to give graphic representation of clay particle size

MUCH work has been done on the effect of various clays on the strength properties of sand and how clays affect defects, etc. Little attention has been paid, however, to the relative particle size of the clay, how it can be changed, and what effects it has on sand properties. As testing and control of foundry sand increase, more information is needed about the size and effect of fine or clay-sized particles in the sand mass.

These particles include all those too small to be retained on the 270-mesh screen used in a standard screen analysis and may be roughly classified by size into two classes: 1. Silt—particles 64 to 5 microns in diameter. 2. Clay—less than 5 microns in diameter.

It must be understood that these classes are very broad and may overlap a great deal. For example, clay particles actually may be much larger than 5 microns, and silt (sand particles) may be small enough to be included in the clay range.

The most popular methods for sizing and classification of extremely fine particles are based on sedimentation—that is, allowing particles to settle in a medium such as water. It is known that if two round objects of the same material but of different size are dropped into water, the larger object will settle faster. The greater the difference in size between these objects, the greater the rate of settling will differ. By application of Stoke's law, which states that the distance a particle falls in a suspension medium in a given time is dependent on its size, everything else being constant, the amount and size of the particles can be determined.

Size Determination Methods—Three methods are used most frequently by foundries to determine the fine particle size of soils and sands. All are based on Stoke's law: 1. Pipette method. 2. AFS clay method. 3. Hydrometer method.

In the pipette method, a sample is dispersed in distilled water by stirring, then placed in a cylinder to settle. After a given period of time, all particles above clay size will have settled below a certain level, say 5 in. below the surface. A pipette then is inserted 5 in. below the surface and a measured sample taken. The sample then is dried and weighed, the result being converted into a percentage figure. Not only is a great deal of care necessary in conducting this test, but the time required may

SIZE

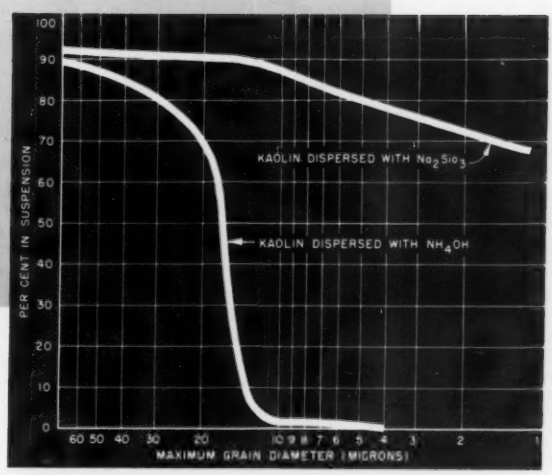

Fig. 2—Upper curve is kaolin clay dispersed with Na+. Lower curve is same clay dispersed with NH_4+

be several days. Therefore, even though it is quite satisfactory in the laboratory, the pipette method is not practical for foundry control.

The AFS clay test is somewhat easier to perform than the pipette method, but gives much less information. This test consists of allowing a sample to settle for a given period of time, then siphoning off the water above a certain level. This operation is repeated several times until all particles below 20 microns in diameter are thought to have been removed. The AFS clay test figures mean total particles 20 microns or smaller. True clay is defined as particles less than 5 microns. The ease of performing the AFS clay determination is counterbalanced by the possible experimental error and the fact that the information obtained is of little value.

In 1926, George J. Bouyoucos published the first of his many papers on the hydrometer method for determining the colloidal content of soils. The original method described by Bouyoucos is as follows:

A 50-gram sample is placed in a dispensing cup. The cup is partly filled with water and 5 cc of a solution of sodium silicate and 5 cc of saturated and filtered sodium oxalate are added as a dispersing agent. The contents are stirred for ten minutes, transferred to a cylinder, and upended several times. The time is noted after upending, and hydrometer readings are taken at the times corresponding to the particle size wanted. Hydrometers are available that will read directly in per cent of solids in suspension, thus eliminating most of the required calculating. For a more detailed description of the hydrometer test method and procedures, the reader is referred to the references at the end of this article.

As good as this method was for soils, it had its shortcomings for foundry sands. As Bouyoucos noted, "In materials such as bentonite and fuller's earth, the hydrometer method may not be very successful, because these materials tend to gelatinize and emulsify and cause the hydrometer to stick and not to float normally and fully, as it does in true suspension."

Two Problems—In foundry sands, not only does the presence of bentonite cause trouble, but the clay particles normally adhere to the sand grains and for accurate clay determinations must be freed from them. Research work has provided the answer to both of these problems, thus making the hydrometer method adaptable to the testing of foundry sands. Bouyoucos recommended the use of the Na+ ion for a dispersing agent, but is was found that the NH_4+ ion does just as well and does not cause bentonite to gel. Boiling prior to stirring aids in freeing the clay from the sand grain, thereby allowing a true clay reading.

Use of the hydrometer test to study clay particle size shows up some of the basic differences between clays and highlights their performance variations. The work reported here is by no means intended to be complete, but only lays the groundwork for future research.

By the use of the hydrometer test, it was found that clays may be classified according to particle size into three broad categories: 1. Fine Clays—An average particle size of less than 2 microns. All western bentonites fall into this class. 2. Medium Clays—An average particle size between 2 and 5 microns. Fire clays and southern bentonites are in this range, together with most combinations of clays. 3. Coarse Clays—An average particle size of more than 5 microns. Kaolin clays may fall in this classification, depending on various conditions.

Results of the hydrometer test may be plotted, as shown in Fig. 1, to give a graphic representation of a clay's particle size. This graph can be used to show the differences that may arise if varying definitions for clay are used. For example, the following table lists the percentage of clay that would be reported by different testing methods.

Test Method	Western Bentonite	Fireclay	Kaolin
AFS Clay (20 mu).....	83%	58%	72%
Pipette method (5 mu)	82%	27%	2%
Hydrometer method (average particle size)	1.2 mu	3.1 mu	14.5 mu

Although any definition for clay is open to discussion, it readily can be seen that average particle size, as obtained by the hydrometer test, presents

a better picture than do the other two methods.

Conditions Affect Size—Conditions under which a clay is used may vary and thereby change its average particle size. It would not be correct to assume that the results shown depict the actual particle size of the clay in the sand mass. They show only effective particle size—that is, the particle size under the specific conditions of the test. These conditions often are optimum and, therefore, represent the desired or most effective distribution.

To obtain maximum effect from any clay, certain

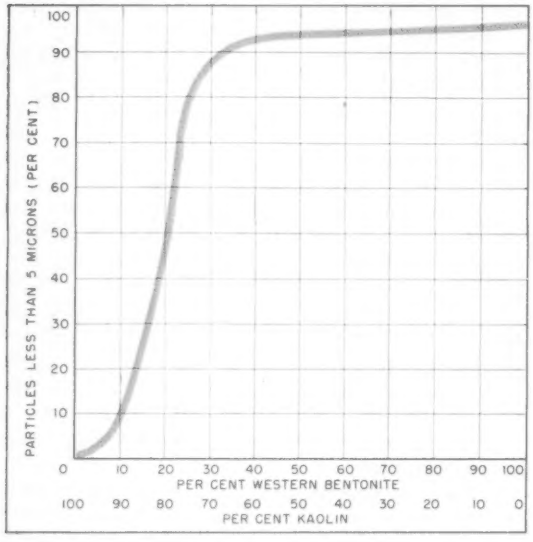

Fig. 3—Chart illustrates the advantage of using combinations of clays rather than a single clay

conditions must be maintained in the molding sand. One of the most important of these is pH, the relation of which to sand properties has been considered actively only within the last few years. Not only the pH of the molding sand is important, but also that of the ions that are added to obtain the pH and their effect on the various clays in the sand. Different degrees of dispersion result, depending on the ion and the clay or both. It would be difficult to say which is the more important.

Western bentonite is dispersed by the ammonium ion (NH_4+), whereas the sodium ion ($Na+$) causes flocculation and the formation of a gel. Kaolin clays are dispersed by both the ammonium and sodium ion, but the sodium ion is by far the more effective of the two. In Fig. 2 the upper curve is kaolin clay dispersed with $Na+$, and the lower curve is the same clay dispersed with NH_4+. The effect of the sodium ion is so great that although no particles were reported less than 4 microns with NH_4+ ion present, now there are 78 per cent less than 4 microns.

Combinations Advantageous—The advantage of using combinations of clays rather than a single clay is evident from Fig. 3, which shows that kaolin clays can be dispersed by small quantities of bentonite. Western bentonite contains the sodium ion and southern bentonite the calcium ion, both of which aid the dispersion of the kaolin.

Fig. 3 shows the increase in the number of clay particles less than 5 microns in diameter when increasing additions of western bentonite are made to kaolin clay. This curve illustrates how, under certain conditions, a kaolin clay will have essentially no clay-sized particles, whereas with the addition of western bentonite, the kaolin becomes dispersed, the average particle size is reduced, and the kaolin can act as a true clay.

The hydrometer test can be used to compare the actual average clay particle size with the clay particle size that can be obtained with proper sand conditioning. Fig. 4 shows the results of tests run on a squeezer sand with and without the addition of a dispersing agent. When no dispersing agent is added, the amount of dispersion of the clay particles that takes place is wholly a function of the condition of the sand as it is used in the shop. When the test is repeated and a dispersing agent added, it can be seen how the average clay particle size can be improved by proper sand conditioning. The number of clay particles less than 5 microns in size is increased approximately 200 per cent by the proper pH adjustment of the sand shown in Fig. 4.

The purpose of this paper is not to solve any sand problems, but to call attention to the importance of clay particle size (it even may be more important than sand grain size) and, perhaps, to encourage some one to do further work on the effect of clay particle size on sand properties and characteristics.

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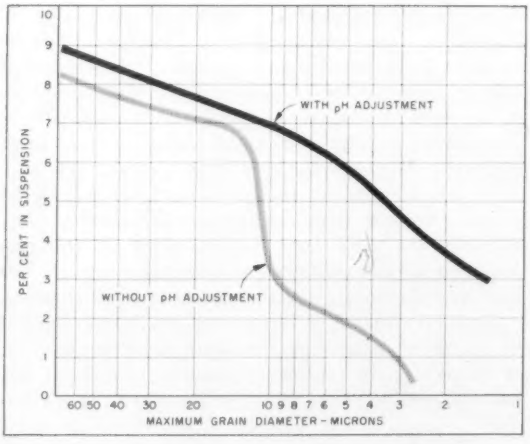

Fig 4—Results of tests run on a squeezer sand with and without addition of a dispersing agent

Analysis Control of

Tin Bronze and Gun Metals

Ethylenediaminetetraacetate (EDTA) titration method has made possible rapid and accurate analysis of tin bronzes and gun metals

By JORMA KINNUNEN and BERTIL WENNERSTRAND
Outokumpu Oy, Metalworks
Pori, Finland

ALTHOUGH spectrographic and x-ray methods are used widely in quality control of metal and alloys, chemical methods still occupy an important position in analytical laboratories. Further, many modern chemical methods are rapid and accurate and are preferred to physical methods. The introduction of the ethylenediaminetetraacetate (EDTA) titration especially has revolutionized thinking as to the use of chemical methods.

For example, by EDTA titrations it is possible to determine sequentially copper, lead, and zinc in copper-base alloys within a period of seven minutes.[1] Tin in a separately weighed sample can be titrated with iodine after rapid reduction with sodium hypophosphite. The working time is about 15 minutes.[2,3,4,5]

Further, when xylenol orange is used as the indicator in an EDTA titration, it is possible to speed the determination of tin in tin bronzes.[6] Interferences by lead and zinc can be avoided by the use of sodium thiosulfate as a masking agent.[7] This procedure permits the accurate determination of tin in gun metals and admiralty brass within four minutes.

Reagents include the following:

EDTA Solution, 0.01 Molar — Dissolve 3.722 grams of reagent grade disodium ethylenediaminetetraacetate dihydrate and dilute to one liter with water (1 ml of this solution is equivalent to 1.187 mg of tin).

Dinitrophenol Indicator — Prepare a saturated aqueous solution of the indicator (metanil yellow indicator. Prepare 0.1 per cent aqueous solution).

Xylenol Orange Indicator—Prepare 0.5 per cent aqueous solution. (The powdered indicator currently is available from Chemapol, Prague, Czechoslovakia, or Dojindo & Co., 38 Kamitoricho, Kumamotishi, Japan.)

Thorium Nitrate Solution, 0.01 Molar—Dissolve 5.5222 grams of thorium nitrate tetrahydrate with water and 3 ml of concentrated nitric acid. Dilute to one liter with water, and standardize against the 0.01 M EDTA solution using xylenol orange as indicator.

Procedure—Place a 0.25-gram sample in a 400-ml beaker. Dissolve the sample with 5 ml of concentrated hydrochloric acid and 2 ml of concentrated nitric acid (avoid unnecessary evaporation). Add with mixing a 5-ml excess of 0.01 M EDTA solution. Dilute the solution with water to a volume of 150 ml and stir with a glass rod. Add with stirring 50 ml of saturated thiourea solution and 3 to 4 ml of dinitrophenol indicator or 1-2 drops of metanil yellow indicator. Now add slowly and with stirring a 10 per cent ammonium acetate solution from buret until the color is faintly yellow (about 35 to 50 ml). The pH is thereby in the range 2 to 2.5.

If the color is a pronounced yellow, add a few drops of dilute hydrochloric acid. Add slowly and with mixing about 25 ml of a 25 per cent sodium thiosulfate solution and a few drops of xylenol orange indicator. Titrate with 0.01 M thorium nitrate solution until the solution color is red, then back-titrate to the appearance of a yellow color with 0.01 M EDTA solution.

Results and Remarks—Some typical results showing the excellent accuracy and reproducibility of the procedure are given in the accompanying table. It should be noted that phosphorus in amounts greater than 0.5 per cent interferes in the procedure.

Alloy Sample	Tin, % Present	Tin, % Found
Tin bronze A.....	9.75	9.76; 9.74
Tin bronze B.....	6.10	6.02; 6.05
Gun metal	7.60	7.60; 7.63
Admiralty brass	0.80	0.81
Tin solder*	50.00	50.00-50.20
White metal*	41.40	41.50

*Only a few drops of thiourea solution

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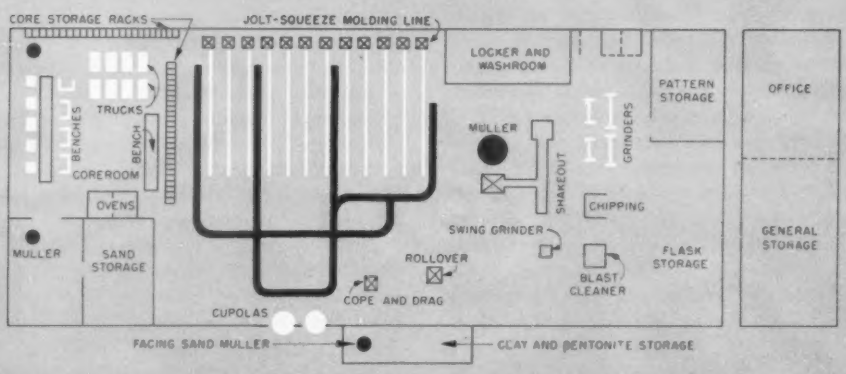
Palletized conveyor system transports molds to the pouring area. Each molder is responsible for his own production and places a complete mold on the pallet conveyor



Floor plan diagram shows relationship of various departments that provide Inter-State Foundry Co. with a smooth-flowing, efficient production system

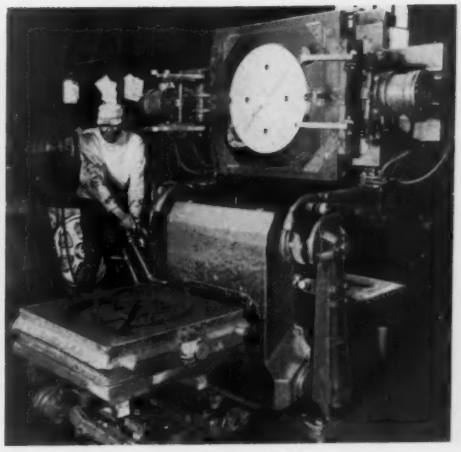
Gray Iron Foundry Pursues

Continued Plant Improvement

Indianapolis foundry remains competitive by a continuing program of plant improvement aimed at reducing manufacturing costs and increasing volume

By KENNETH L. MOUNTAIN

Variety of mold sizes can be made on the portable jolt-squeeze machines in the molding line



One rollover unit is used for larger, specialized work in flasks up to 36 in. square

GROWTH and change have dominated the history of Inter-State Foundry Co., Indianapolis. Founded in 1905 as Inter-State Car & Foundry Co., it first produced original and repair castings for railroad cars. Since then, the company has grown with the economy. Its present products include a wide variety of gray iron castings for railroad, automotive, road building, construction, and lawnmower applications. In 1931, the company employed six men and operated one small cupola. Today, employment totals 85, and two large cupolas are in use.

In support of its desire to remain competitive, Inter-State years ago embarked on a continuing program of plant improvement. This program has included provision of a cement floor over the entire under-roof area, installation of locker rooms and shower facilities, relocation of cupolas to the center of the building, installation of pouring tramrails, and the regular purchase of modern equipment.

In 1956, the major operational change was the reduction of the melting capacity of the cupolas from 11 to 5¼ tons per hour on a continuous-tapping basis and a conversion to water cooling. Success of this changeover has permitted the foundry to switch from a mold-in-the-morning, pour-in-the-afternoon operation to a continuous system. In 1957, the major change was installation of a pallet-type mold conveyor which has improved molding and pouring practices greatly.

As a result of the program, manufacturing economies have been realized, and volume has increased although the number of men required to pour molds has been more than cut in half. About 175 tons of castings are made each week, and efficiency has improved to 40 to 45 manhours per ton of castings shipped. Most castings made range from a few ounces to 270 lb in weight.

Metal Supply—Scrap and pig iron are received in railroad cars on a siding adjacent to the cupolas. Steel scrap is unloaded with an electric magnet, and pig iron is unloaded by hand on an incentive basis. Scrap consists of graded and sized machine scrap, machined turnings from customers, structural I-beams, and steel plate.

Melting—Charge material is weighed in wheelbarrows on a scale before it is loaded into a drop-bottom charging bucket. The bucket is hoisted by a direct-lift cable to the cupola charge-door. The lift swings on a boom at its upper level so that the charge can be maneuvered into either of two cupolas, which are used on alternate days.

The cupolas are lined to 42 in. and are water-jacketed, front-tapping, front-slagging units which pour continuously into a large holding ladle. Slag is drawn off the front side to a ladle suspended from an overhead rail system.

Metal charges are about 1500 lb each. They consist of 300 lb malleable pig; 400 lb steel scrap; 750 lb home and purchased cast scrap; and 40-65 lb of silvery pig, depending on the chill desired. Chrome, copper, molybdenum, and nickel additions are made in the ladles or at the cupola spout.

Metal Composition—Chemical composition of the base metal approximates these percentages: C, 3.25—3.50; Si, 2.00—2.30; Mn, 0.60—0.90; S, 0.15; P, 0.20. Test slugs are taken regularly on all heats and are analyzed daily by a commercial laboratory. Physical properties include a brinell hardness of 170—223; minimum transverse load of 2200 lb; minimum deflection of 0.20 in.; and minimum tensile of 30,000 psi.

Metal is tapped at 2840-2860° F and is checked continually with an optical pyrometer. Metal is transferred from the holding ladle into 300-lb pouring ladles and carried to the molding floors by overhead tramrail. All molds are poured at metal temperature above 2650° F to avoid difficulty with thin-sectioned castings. The tramrail ladles are lined with carbon brick, ground to shape. A ladle wash is used to insure long service life.

Sand—A Michigan City four-screen base sand is supplemented with some Vassar sand, to which seacoal and southern bentonite are added. About 12 lb of seacoal are added to each 2000-lb batch of sand to maintain the desired qualities in the all-pur-

A front-end loader is used to distribute newly prepared sand to individual molding stations

Continuous belt conveyor in coreroom carries cores to storage racks for movement to ovens

After baking, cores are taken to an adjacent bench for assembly and storage until needed

Charge material is weighed in wheelbarrows on scale prior to loading into charge bucket

pose molding sand. Permeability of this blend is 60. Green strength is 8, and moisture content is 5 per cent.

A 300-lb capacity muller is used to prepare a facing sand mixture for larger castings, which are made on a rollover machine. The facing mix is the basic sand mixed with a Juniata bank sand and a bonding agent.

Molding—Molding equipment consists of 12 jolt-squeeze machines (up to 17 x 17-in. flasks), one rollover unit (up to 36 x 36-in. flasks), one cope and drag unit (up to 22 x 22-in. flasks), and one bench machine for small, miscellaneous work. The squeezer machines are portable. As completed, molds are placed on pallets on the conveyor, and filled pallets are rolled to pouring stations, where molds are poured from the tramrail ladles.

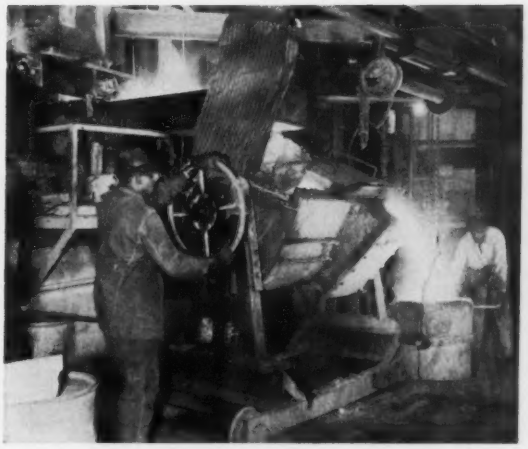
Each molder is responsible for his own production and sets a complete mold on the pallet conveyor. Weights and jackets are placed on the molds by the pouring crew.

Coremaking—The coreroom contains five core-blowers and four bench stations for hand work. Cores ranging from a few ounces to 100 lb are made regularly. A continuous conveyor belt, 18 in. wide x 30 ft long, situated between the line of core-blowers and benches, transports cores to storage racks for later movement by hand-operated hydraulic lift truck into either of two batch-type core ovens. After they have been cured, cores are transported to an adjacent station for assembly or for storage until needed.

Core sand is received in railroad box cars and unloaded directly into a 200-ton capacity, inside storage room adjacent to the core sand muller. A Michigan City sand of 50-52 AFS fineness is used. Batches of 300 lb are prepared in a six-minute cycle. For light work, 1 per cent oil, 1 per cent flour, and $2\frac{1}{2}$ per cent water works satisfactorily. For heavy work, the oil is increased to $1\frac{1}{3}$ per cent. This mixture provides cores that are smooth and open enough for the work being done. If surface problems develop, a zircon wash is applied. Some experimental work has been done with CO_2 cores, but oil cores have proved satisfactory for most designs.

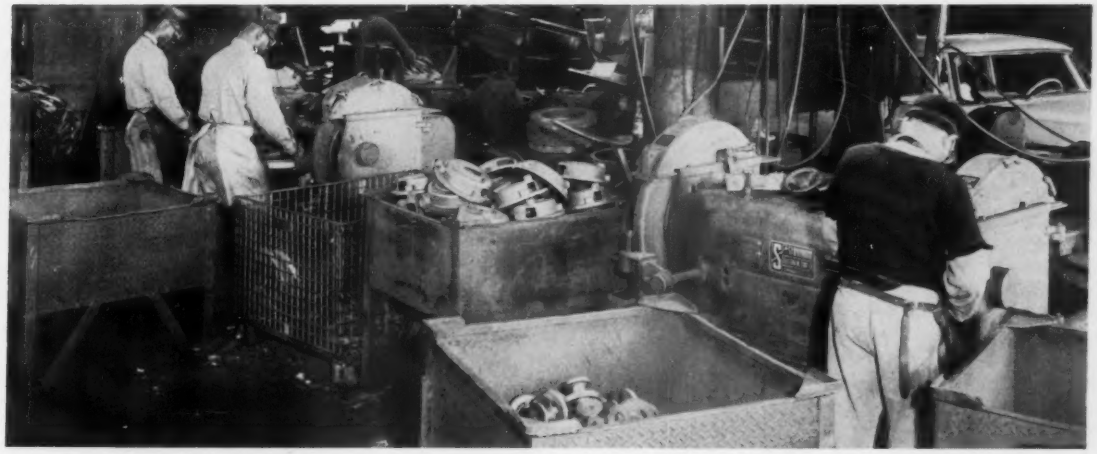
Sand Preparation—Poured molds from the various pouring floors are taken by front-end loader to an oscillating shakeout. Castings and sand are dumped into the shakeout hopper, and sand falls onto a vibrating screen. Gates and risers are knocked off by hand, and the castings are segregated into metal boxes for cleaning and finishing operations.

From the vibrating screen, the sand drops onto



Metal is tapped from large holding ladle into smaller, overhead tramrail pouring ladles

Molds are poured on conveyorized pallets that roll to pouring station from the molding line



Heavy-duty, double-end grinders are used for grinding-finishing operations when required

an inclined conveyor belt 18 in. wide and passes over a magnetic separator that removes any tramp iron present. After separation, the sand falls into a bucket-type elevator for movement into a 2000-lb storage bin.

When this bin is full, a horn sounds, and the sand is emptied into a 2000-lb batch muller. Additions are made as required, and the milling cycle is started. When the 2½-minute cycle has been completed, the sand is fluffed out onto the floor by an aerator. The sand is removed to a nearby heap by the front-end loader, prior to distribution to the individual molding stations.

Cleaning and Finishing—After gate removal and segregation of castings by job and type, castings are cleaned by shot blast and placed in metal boxes for transportation by lift truck to the grinding-finishing department.

Two heavy-duty, double-end grinders, one double-end, narrow-wheel grinder for grooving pulleys, one swing-frame grinder, and one chipping station are used to clean castings prior to shipment. To eliminate production bottlenecks, cleaning operations are performed the day after castings are poured. Castings are shipped daily by commercial carrier.

No pattern shop is provided since all work is done exclusively from customer patterns. A large, separate pattern storage building is available, and some 3000 patterns valued at about $1½ million are inventoried.

At Inter-State, piece work rates and standard-hour incentives are applied to various production operations. After seven years of experience with the program, management is convinced that it is better able to know exactly what its production costs are so that a realistic pricing policy can be established. Employees are convinced that they can turn out an increased volume of quality castings to increase their earnings while they work the same number or fewer hours. The company feels that the most important point regarding the incentive program is that each employee retains his right to his own initiative.

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Questions and Answers

Several possible methods exist for making semi-permanent molds . . . Melting iron in cupola dissipates tellurium . . . Fluidity of iron affected by phosphorus . . . Makes roll casting . . . Scrap figures . . . Brass fittings

Considers Use of Clay Molds

Due to a disabling accident I cannot carry on my former occupation as a molder or coremaker, but could do some light work at home, such as making clay molds which I heard about. Can you supply me with any information on what clay is used, how many castings can be obtained from one mold, etc.?

Years ago the Chinese employed clay molds for making extremely thin hemispherical cooking pots of cast iron, and the practice may still continue in some areas. The molds were swept up on iron spiders or arbors to provide reinforcement, and were well vented with numerous holes. After sweeping up, the molds were baked slowly until perfectly dry. Dry molds always were heated prior to use, and reports were that they could produce numerous cooking pots before cracking made them unfit for use. However, while they were called clay molds, they were made of a mixture of finely ground broken pottery and local clay, probably a fireclay.

Although no information is available on the proportions of the ingredients used by the Chinese in making the molds, we believe that a mixture of ground firebrick and fireclay would serve the same purpose. You probably will have to experiment on the amounts of each to develop a mixture which will be free from cracks after baking at high temperature and for a reasonable time in use. You might try a mixture of 10 per cent fireclay and 90 per cent firebrick by weight with 6 to 7 per cent moisture.

It occurs to us that instead of clay molds, you might be able to use cement-bonded sand molds, and eliminate the necessity of baking. A suitable mixture is composed of 100 lb of clay-free silica sand of 45 to 55 AFS grain size, 13 lb of high-early-strength portland cement, and about 6 per cent water. The molds are air dried for 72 hours prior to use.

Other possibilities are clay-free or low-clay sands bonded with sodium silicate and hardened by gassing with carbon dioxide, or by baking. Another type of mold commonly used in investment molding practice is refractory material bonded with hydrolized ethyl silicate. Such molds are baked at high temperature to drive off the moisture and solidify the bond. It is reported that molds of this type have produced several hundred aluminum alloy castings before becoming unfit for use.

Tellurium Removed from Scrap

We are using tellurium in the proportion of 1 gram to 100 lb as an antidote against pinholes in our basic cupola-melted nodular iron. Will the tellurium build up in our returns, and if so, will it prevent us from making a 3 per cent Si, as-cast nodular iron with 10 per cent elongation?

According to an article, "Use of Tellurium in Promoting Chills in Gray Iron Castings" by C. R. Austin in the July, 1949 issue of FOUNDRY, the effect of tellurium disappears when scrap containing it is remelted in the cupola, and scrap segregation is unnecessary. He also points out that tellurium added in large amounts to gray iron forms tellurides, but metallographic evidence of that phase is lacking with the very small amounts (0.10 to 0.005 per cent) employed for the purpose of promoting a chill. Hence, it appears that you should not have any difficulty in producing the high-silicon nodular iron.

Although you do not mention it, we presume you are making additions of cerium or misch metal in connection with the tellurium since the latter is considered to be subversive like lead, bismuth, antimony, etc., as far as effect on formation of spheroidal graphite is concerned.

Phosphorus Affects Fluidity

Our foundry believes that phosphorus in the region of 0.9 per cent is required to run thin gray iron sections in green sand molds. We are not sure whether that will be necessary where the iron is melted in an electric furnace and the metal temperature is more easily controlled. What we are trying to discover is whether phosphorus does affect the fluidity of the iron to any great extent. We feel that the accepted value of the phosphorus content may have grown up because the pig iron we have been using is fairly high in phosphorus, and this is only the case because it is made from phosphoric ore. No steps are taken in present cupola practice to increase or decrease the phosphorus. If gray iron melted in the electric furnace had to have a fairly high phosphorus, presumably we could attain that by some suitable phosphoric addition.

Phosphorus does have an effect on the fluidity of gray cast iron, but its influence is not as great as often is assumed. Investigations indicate that it is only one-half as effective as carbon. The latter value is based on work by Evans as described in the *Journal of Research and Development* (BCIRA) December, 1953, which gives the formula for carbon equivalent based on fluidity of CEF as equal to TC plus Si/3 plus P/2.

Since phosphorus reduces the impact resistance of gray iron by forming brittle constituents, the tendency in this country is to limit the content where shock and impact may be encountered. In the automotive field the maximum phosphorus is set at 0.25 per cent, in some cases as low as 0.10 per cent.

In discussing fluidity, effect of temperature must not be forgotten. Many consider it the most important single factor. Work by Porter and Rosenthal, as reported in *Transactions*, AFS, 1952, indicates that fluidity increases an average of 5 in. (as measured by a spiral fluidity test) per 100° F increase in temperature when the temperature is more than 350° F above the liquidus for the iron.

With electric furnace melting which, as you mention, permits excellent control of temperature as well as composition, you should have no difficulty in pouring thin-section castings by making suitable adjustments.

Determining Conversion Loss

We are using the following to determine the oxidation percentage or loss in our cupola operation from daily foundry reports: Total weight of iron charged minus total weight of good and bad castings plus the drop. Resulting figure divided by the total weight charged gives the loss in per cent. Is it correct to include the weight of the drop, and what is considered a normal oxidation loss?

Your method gives a rough determination of conversion loss rather than oxidation loss, and the drop —presumably meaning the metallic content—should be included. For a more exact determination you would have to go much further and account for all possible metallics. Spills around the pouring area, ladle skimmings and skulls, and the slag would have to be examined for actual metal content, and the amount added to those figures mentioned.

Some years ago Gregg indicated that conversion loss in the cupola may range from 2 to 10 per cent depending on condition of the raw materials and operating procedure. With good, clean raw materials and good operation the loss would be around 2 per cent while with dirty, oxidized or light-sectioned scrap, the loss might be 10 per cent.

Carbon Content Runs Too High

We operate a small cupola lined to 32 in., and for years were able to maintain a suitable total carbon content in our iron. This is important since a large percentage of our work is in the alloy iron field. About 6 months ago our carbon content began to increase steadily to a point where it seriously affects our product. We have tried increasing the steel content of the charges, but even an 80 per cent steel addition produces carbon contents from 3.60 to 3.80 per cent. We also have tried more and less blast, higher and lower beds, reducing coke splits, large and small size coke, and change of coke source —all without producing any material effect. Engineers from two different coke companies have endeavored to solve the problem without success. Have you any suggestions?

While it seems somewhat unusual that you were able to maintain the carbon content of your iron without difficulty until a few months ago, such things do occur, and it often requires considerable work and effort to determine the cause or develop a remedy. From your statements, although not specific except with reference to the amount of steel scrap, it appears that you have tried the variations in practice usually suggested to produce lower carbon content.

Carbon pickup in the cupola occurs essentially through carburization and is dependent on the CO content of the gases in contact with the melting and molten metal; hence indirectly it is a function of the stage of combustion. That opinion appears to be confirmed by data of Massari covering simultaneous analyses of iron and effluent gases from the cupola. This study showed an increase in carbon pickup with an increase in CO content (decrease of CO_2) of the gas.

One of the factors involved in the differences in the CO/CO_2 ratio in the cupola is the reactivity of the coke. Reactivity is not to be confused with ignitibility or combustibility, since it is a measure of the reduction of carbon dioxide by carbon or, in other words, the oxidation of the carbon in coke by carbon dioxide producing CO.

Hence, a coke with high reactivity results in higher CO in the cupola and greater carbon pickup than does a low-reactivity coke. While it is possible there has been a change in reactivity of the coke, you mention you have tried different coke, and it hardly seems likely that both cokes would be highly reactive. One answer would be to obtain a sufficient quantity of high-ash coke, and observe the results from its use.

You mention that you have tried changing the blast, but possibly you did not increase it sufficiently to obtain proper combustion with the particular type of coke. It might be pointed out that unless you have equipment for measuring air flow in either cubic feet or pounds per minute, you have no definite way of ascertaining how much air is being blown into the cupola.

Adjusting Alloy Composition

We have an order for a small lot of bearings to be made of 80-10-10 alloy, but we do not have any of that ingot on hand. We do have plenty of 85-5-5-5 ingot, however, and wonder if we could make the bearings from that, or possibly make additions of such materials as lead, genuine babbitt, scrap worm gears which we have on hand.

Since the 85-5-5-5 alloy is not a bearing alloy, it hardly can be used for the purpose you have in mind. Also, no amount of juggling with that and the other alloys mentioned will result in the 80-10-10 composition. Possibly with the babbitt, some copper, lead, and the 85-5-5-5 alloy you could approach the 83-7-7-3 alloy termed medium bearing bronze. You would have to know the composition of the babbitt, however, since it contains, in addition to the tin, an appreciable

amount of antimony.

Antimony tends to produce in bronze a dendritic structure, a reduction in resistance to impact, and brittleness. Assuming that the babbitt contains 89 per cent Sn, 3.5 per cent Cu, and 7.5 per cent Sb, you can use up to about 4.5 lb in a 100-lb mix which results in 0.34 per cent in the final alloy. This figure is under the permissible maximum of 0.35 per cent.

Although there are a number of possible combinations of the various materials, perhaps the most suitable would be 80 lb of the 85-5-5-5 ingot, 3 lb babbitt, 3 lb lead, and 14 lb copper. It will result in an alloy containing slightly over 82 per cent Cu, about 6.7 per cent Sn, 7 per cent Pb, 4 per cent Zn, and 0.23 per cent Sb.

Another combination that would be almost up to the limit on antimony, but closer to the desired composition of other elements would contain 60 lb of the brass ingot, 4.5 lb babbitt, 4 lb lead, and 31.5 lb copper. Final analysis would show 82.66 per cent Cu, 7 per cent Sn, 7 per cent Pb, 3 per cent Zn, and 0.34 per cent Sb.

Making Hollow Roll Casting

We operate a foundry in Central America and use an acid-lined electric furnace for melting. We have an order for some hollow rolls for a sugar refinery, and we would like some information on making them since we have not had any experience with that type of casting. The rolls are 30 in. OD, 14 in. ID and 36 in. long. We will use a synthetic iron containing about 3.25 per cent TC and 2.25 per cent Si. Can you give us information on how the casting should be poured, method of gating, etc.?

For a casting with a wall thickness of 8 in. the silicon content you mention is extremely high, and will result in a coarse, open-grain structure which will have low wear resistance in the intended application. We would expect the silicon content to be under 1 per cent, possibly 0.60 to 0.80 per cent. Since you are using synthetic iron, assuming it to be all scrap, you should have no difficulty in producing the desired composition by increasing the amount of steel scrap or reducing the amount of silicon bearing material.

We believe that the roll should be poured in the vertical position, using a ring of pop gates. Height of the roll should be increased 4 to 6 in. to form the riser or feeder which later is cut off in the machining operation. Pop gates should be at the bottom of a suitable ring basin situated over the mold cavity so that the gates are midway between the inside and outside diameters. Six gates ¾-in. in diameter and equally spaced around the periphery should serve. Since you are not familiar with making such large castings, it might be a good idea to dry the mold to eliminate any blows.

Scrap Figures Not Available

Of great interest to us is the national scrap factor average on various cast metals and alloys such as low and high alloy steels, gray iron, nodular iron, manganese bronze, red brass, aluminum-base and magnesium base alloys. Practically all the castings we make are jobbing variety and must meet close specifications on analysis and 100 per cent x-ray examination for soundness. Welding is held to a bare minimum.

So far as we know, no figures are available which might be construed as average scrap losses. This is not surprising in view of the wide variety of castings produced, and the wide variations from foundry to foundry with the same type of casting due to differences in melting, molding, and other practices.

Even in one foundry there often are marked differences in scrap losses on different castings. In foundries where close control is maintained on every step of production, the scrap loss naturally will be lower than where control is loose and, of course, considerably lower than where control is nonexistent.

Analysis for Brass Fittings

We are considering the production of brass sweat fittings and plan to use 100 per cent scrap. Can you suggest suitable additions and the amounts which will make good castings?

We believe that either the 85 per cent Cu, 5 per cent Sn, 5 per cent Pb, and 5 per cent Zn, or the 81 per cent Cu, 3 per cent Sn, 7 per cent Pb, and 9 per cent Zn alloy should serve for the fittings. We assume by sweat fittings you refer to those which are joined to copper or brass pipe by a sweat soldering operation.

The only way to approach those compositions with miscellaneous brass scrap as the base would be to melt it down and pour it into ingots. The ingots would have to be subjected to chemical analysis to determine the composition, and then suitable adjustments made to meet the requirements of the particular alloy selected. You will be much farther ahead to buy ingot of the desired composition rather than to try to run a smelter as well as a foundry. It might be pointed out that if some aluminum bearing or silicon containing scrap inadvertently becomes mixed in with the red brass, you will have difficulty in obtaining leakproof castings.

Correcting Blows or Scabs

We will appreciate advice on a suitable sand mixture for producing medium-heavy castings by the dry sand process. We make heavy centrifugal pump casings and impellers, and have trouble with blows or scabs. We use a heavy molding sand to which we add bentonite and core compound.

Various sands are employed for dry sand molding. In some cases such sands are used for dry sand work because they will not serve satisfactorily for green sand molding. Possibly the sand you now are using contains sufficient bond to provide a satisfactory dry sand mold without the addition of the bentonite and core compound. Addition of those materials may reduce the permeability and cause the blows.

Again, the molds may not be dried as thoroughly as they should be, especially if they are allowed to stand for a considerable period before closing and pouring. That permits moisture in the interior to work its way to the face and cause trouble.

Possibly the vent is not releasing gas freely from the mound of sand that forms the inside of the half pump body castings. It may be necessary to vent the sand with a wire and, in extreme cases—especially in the larger size—with a riddleful of small coke.

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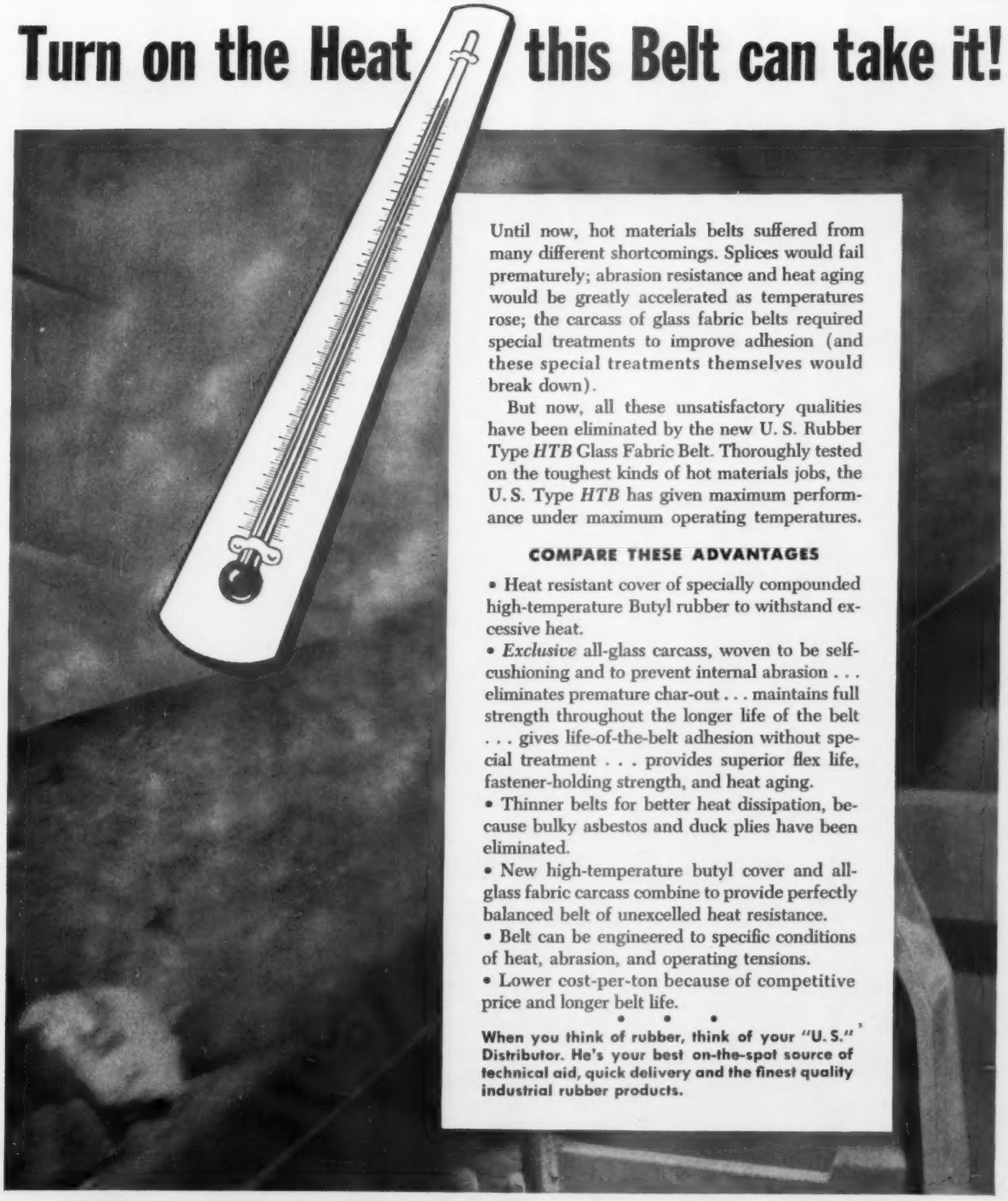

Until now, hot materials belts suffered from many different shortcomings. Splices would fail prematurely; abrasion resistance and heat aging would be greatly accelerated as temperatures rose; the carcass of glass fabric belts required special treatments to improve adhesion (and these special treatments themselves would break down).

But now, all these unsatisfactory qualities have been eliminated by the new U. S. Rubber Type *HTB* Glass Fabric Belt. Thoroughly tested on the toughest kinds of hot materials jobs, the U. S. Type *HTB* has given maximum performance under maximum operating temperatures.

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- Thinner belts for better heat dissipation, because bulky asbestos and duck plies have been eliminated.
- New high-temperature butyl cover and all-glass fabric carcass combine to provide perfectly balanced belt of unexcelled heat resistance.
- Belt can be engineered to specific conditions of heat, abrasion, and operating tensions.
- Lower cost-per-ton because of competitive price and longer belt life.

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Men of Industry

● EMIL J. ROMANS
. . . becomes foundry supt.

● THOMAS L. HAMMOND
. . . becomes board chairman

● FRANKLIN A. PARK

● LLOYD E. RAYMOND
Singer Mfg. Co. promotions

EMIL J. ROMANS has been appointed foundry superintendent, National Malleable & Steel Castings Co., Cleveland, succeeding **Frank M. Steigerwald,** who has retired after 40 years with the company. He joined the company 25 years ago, became supervisor of molders and labor, and in 1949 was made assistant foundry superintendent. Mr. Romans was recently elected chairman of the Northeastern Ohio Chapter of the American Foundrymen's Society for 1958-59.

Richard Zinn has been appointed general manager of American Chain & Cable Co.'s Malleable Casting Div., York, Pa., a unit of the company's American Chain Div. Mr. Zinn succeeds **Niles L. Kohler,** who became plant manager in 1955, after acting as office manager for 18 years. Mr. Kohler joined the company in 1916.

Jack W. Swantz has been named Pittsburgh district manager, Wheelabrator Corp., Mishawaka, Ind., succeeding **J. F. Underway,** who has resigned to operate his own foundry in South Dakota. **Robert F. Morgan** has been appointed sales engineer and **Rufus F. Duff** abrasive engineer in the Pittsburgh office. **John H. Burlingame** has been made district manager of the company's office in Springfield, Mass. **Charles L. Benham,** formerly district manager there, has retired to an advisory position. He had been with Wheelabrator 40 years. **Robert G. Pfliegel** has been appointed district sales-service engineer in Springfield.

● **Thomas L. Hammond** has been named chairman of the board of directors, Whiting Corp., Harvey, Ill., succeeding his brother, the late Stevens H. Hammond. He is a son of the late Gen. Thomas S. Hammond, who headed the company until his death in 1950. His grandfather, John H. Whiting, founded the company in 1884. Mr. Hammond, a graduate of University of Arizona, joined Whiting's research department in 1946 and until recently was vice president in charge of Trackmobile and General Products Div.

Edward Hill, formerly sales-service representative in the foundry industry in the eastern and southern divisions of Corn Products Sales Co., New York, will concentrate sales activities in the eastern division, continuing his headquarters in Plymouth, N. C. He joined the company in 1946. **Joseph R. Belche Jr.** has been assigned the southeast area, with headquarters in Atlanta. He went with the company last year.

Robert O. Offill has been appointed advisory engineer, and **Stanley D. Whiteside,** staff engineer, Lindberg Industrial Corp., Chicago. Mr. Offill was formerly associated with Westinghouse Electric Corp., and Carnegie-Illinois Steel Co., both of Pittsburgh. Mr. Whiteside's previous associations include W. S. Rockwell Co., Fairfield, Conn., Dow Chemical Corp., Midland, Mich., and Mathieson Chemical Corp., Baltimore.

● **Franklin A. Park** and **Lloyd E. Raymond** have been appointed senior process engineers, Singer Mfg. Co., New York. Mr. Park, a graduate of University of Michigan, has been with Singer since 1935 and in foundry work since 1939. Formerly assistant superintendent in the company's Elizabethport, N. J., plant, he will concentrate on advanced foundry practices, including sand casting, shell molding, permanent molding and the carbon dioxide process. Mr. Raymond attended Massachusetts Institute of Technology and joined the company in 1930. He has been manager of the hardening and japanning departments at the Bridgeport, Conn., plant. He will investigate new processes and developments in investment casting, powder metallurgy and hard surface coatings.

Mervin H. Luria has been appointed Pacific Coast district manager, Luria Bros. & Co., Philadelphia, with headquarters in Los Angeles. With the company since 1939, he was previously with the Brooklyn and Buffalo, N. Y., and Detroit offices.

G. A. Schumacher, formerly superintendent of the LaGrange, Mo., foundry, Gardner-Denver Co., has been named manager of foundry operations, with headquarters in the company's Quincy, Ill., plant. **E. J. Brown,** formerly assistant superintendent, has been appointed superintendent of the LaGrange foundry. Mr. Schumacher joined the com-

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THE LARGEST INDEPENDENT MANUFACTURER OF ABRASIVES – STEEL-TYPE, CHILLED AND MALLEABLE

● HAROLD W. SCHMID
. . . foundry-forge plant mgr.

● WILLIAM R. DODDS
. . . coating resin sales

● RICHARD L. GUTENKUNST

● THOMAS J. GUTENKUNST
Milwaukee Malleable appointments

pany 10 years ago following graduation from University of Michigan. Mr. Brown, who attended Bridgeport Engineering College, joined the foundry inspection department the same year.

● **Harold W. Schmid**, vice president, General Metals Corp., Oakland, Calif., and general manager of its Houston forge plants, has been assigned the additional responsibility of general manager of the company's foundry and forge plants in Los Angeles, where he will make his headquarters. **Leo Wansink**, formerly manager of the company's Los Angeles plant, has been named assistant to the president.

● **John C. Wallace** was recently appointed vice president-operations, Walworth Co., New York, in charge of the company's manufacturing, engineering, and development activities. Mr. Wallace joined the company last year as vice president-manufacturing, after six years with Hunt-Spiller Mfg. Corp., Boston, where he was vice president-general manager.

● **William R. Dodds** has been appointed technical sales representative, Coating Resins Dept., Ciba Co., New York. Until recently supervisor for resin sales in the eastern area, Archer-Daniels-Midland Co., Cleveland, he was previously manager of resin technical sales, U. S. Industrial Chemical Co., New York.

● **Milo L. Phillips** has been named vice president, Alloys & Chemicals Mfg. Co., Cleveland. He joined the company in 1956 as a sales representative. Mr. Phillips will continue as sales and operations manager of the company.

● **Frank J. Palermo** has been named director of manufacturing, J. I. Case Co., Racine, Wis. With the company since 1934 he served in engineering positions at the Rock Island, Ill., and Racine plants, and as superintendent at Anniston, Ala., where he became works manager in 1953. He was transferred to the Burlington, Iowa, plant in 1957, and until recently was works manager of the company's plant in Bettendorf, Iowa.

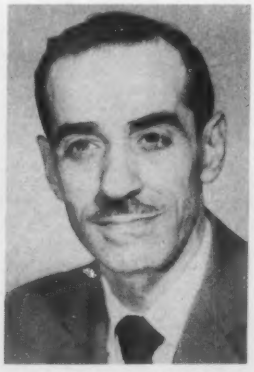
● **Richard L. Gutenkunst** and **Thomas J. Gutenkunst** have been appointed to the sales department, Milwaukee Malleable & Grey Iron Works Inc., Milwaukee. Richard Gutenkunst attended Northwestern University and Thomas Gutenkunst attended Princeton University. Both men have completed company shop practice and sales training courses and represent the third generation of their family in the company.

L. B. Bornhauser has been named group executive of power train manufacturing, Chrysler Corp., Detroit. In addition to his former duties as general manager of the axle and transmission division, he will also be in charge of the engine, electrical equipment, and forge and foundry divisions. Mr. Bornhauser joined Chrysler in 1937.

● **Max De Haas** has been named vice president-engineering, Youngstown Foundry & Machine Co., Youngstown, Ohio. Other appointments include **Axel S. Hellstrom**, chief engineer; **Frank J. Gentile**, assistant chief engineer; **Walter M. Keil**, chief design engineer, roll

● JOHN C. WALLACE
. . . becomes operations v. p.

● MILO L. PHILLIPS
. . . Alloys & Chemicals v. p.

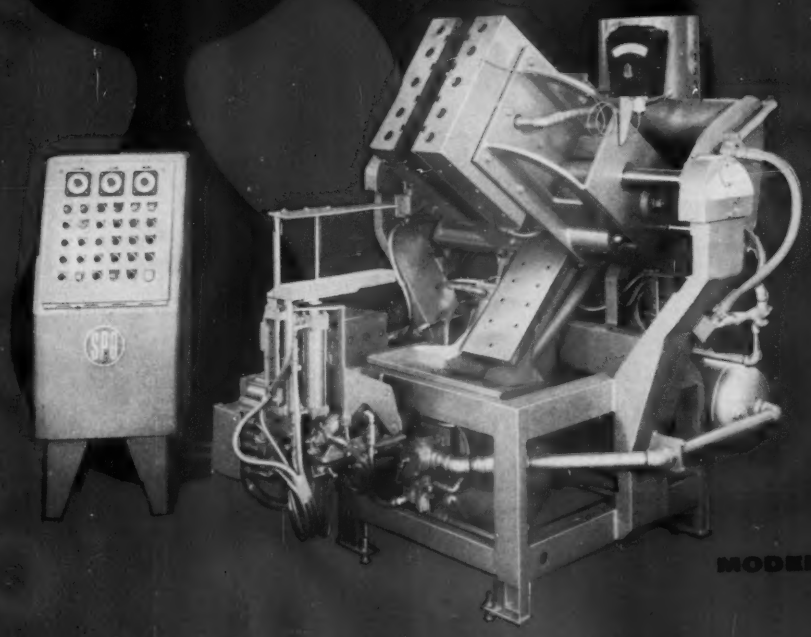


● FRANK J. PALERMO
. . . becomes mfg. director

● MAX De HAAS
. . . engineering v. p.

SPO's ANGLE-BLO holo-core MACHINE

with fully automatic unloader



MODEL SC-30

SPO ANGLE-BLO DESIGN

With core box at 45° angle, uncured sand drops out of upper horizontal arms of core as core box rocks away from blow plate. As box rocks to unloading position, remaining uncured sand drains, leaves cured core with uniform walls.

SPO's new holo-core machine blows, cures, strips, unloads hollow cores or shell molds, recharges sand magazines . . . automatically and without operator attention!

Model SC-30 will mass produce a wide variety of hollow cores and shell molds quickly, economically . . . handles core boxes up to 16 x 21 x 9 inches . . . blows 30 lbs. of solid core . . . permits selection of cycle time and temperature best suited to individual pieces. Before you buy any core blowing equipment, get all the facts on SPO's ANGLE-BLO design.

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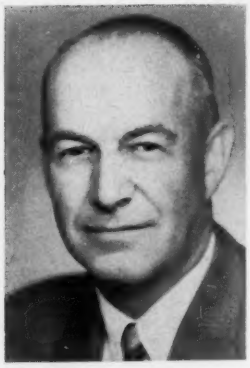
Circle 613 on Page 51

AA-9508

● CHARLES S. ROSENBLUM
. . . becomes advisor to BDSA

● KENNETH H. KIRGIN
. . . joins Motor Castings Co.

● GORDON WILLIAMS
. . . assistant works mgr.



● HARVEY R. HILLER
. . . district sales mgr.

turning and contouring lathes; and **Stephen Poleschuk,** chief design engineer, extrusion presses.

● **Charles S. Rosenblum**, controller-treasurer, U. S. Reduction Co., East Chicago, Ind., has been appointed civilian adviser to the director, Aluminum and Magnesium Div., Business and Defense Services Administration, Department of Commerce, for a period of six months. In addition to his position as controller-treasurer, Mr. Rosenblum is assistant to the president and a director of U. S. Reduction Co.

J. Crawford Donaldson, sales engineer in the Chicago branch office, American Air Filter Co., Louisville, Ky., retired recently after 38 years of selling air handling equipment. He joined Autovent Fan & Blower Co. in 1930. Herman Nelson Corp. acquired the company in 1941 and Mr. Donaldson continued with the Nelson company when it was merged with American Air Filter in 1949.

W. Ashley Gray Jr. has been named western sales manager, and **Lawrence P. White**, eastern sales manager, General Steel Castings Corp., Granite City, Ill. Mr. Gray, who joined the company last year as assistant to the vice president, will be at the company's Granite City office. Mr. White's headquarters will be at the Eddystone, Pa., plant. With the company since 1946, since 1952 Mr. White has been district manager of the eastern sales office.

Roy Perler, for the last five years a senior industrial truck salesman in the New York branch, Materials Handling Div., Yale & Towne Mfg. Co., Philadelphia, has been named eastern regional sales manager.

● **Kenneth H. Kirgin** recently joined Motor Castings Co., Milwaukee, as superintendent of Plant Two. Since 1955 he has been metallurgist and consultant in the production and promotion of ductile iron at International Nickel Co. Following graduation from Rensselaer Polytechnic Institute in 1951, he joined the Melrose Park, Ill., plant, American Brake Shoe Co., where he became general foundry foreman.

Roy W. Schroeder, associate professor of foundry and pattern laboratory, Navy Pier Branch, University of Illinois, Chicago, will spend July in Puerto Rico, West Indies, serving in an advisory capacity to the University of Puerto Rico in establishing the Foundry Section of its Manufacturing Process Course. He will assist in the selection of materials, equipment, small tools, and reference books, recommend visual aids, and outline the course. The university is located at Mayaguez, and Carlos R. Garrett is head of the Mechanical Engineering Dept., College of Agriculture and Mechanical Arts.

Robert R. Dickey has joined Ross Operating Valve Co., Detroit, as sales manager. Mr. Dickey has been field supervisor, Parker-Hannifin Corp., Cleveland, working out of Rochester, N. Y., and earlier out of Baltimore.

Robert A. Moffett has been appointed director of technical service, North American Refractories Co., Cleveland. He has been with the company since 1948. **Fred W. Schroeder** has been appointed director of research in charge of the new research center in Curwensville, Pa. He joined the company in 1956.

● **Gordon Williams,** formerly associated with West Steel Casting Co., Cleveland, has joined Farrell Cheek Steel Co., Sandusky, Ohio, as assistant works manager.

● **Harvey R. Hiller** has been appointed assistant district sales manager in the Chicago district, Harbison-Walker Refractories Co., Pittsburgh. He has been a sales representative in the Chicago area since he joined the company in 1955.

J. J. McGrann has been named Los Angeles district manager, Steel & Tube Div., Timken Roller Bearing Co., Canton, Ohio, succeeding the late S. Robert Kallenbaugh. With the company since 1945 Mr. McGrann recently was Cincinnati district manager. **E. S. Fitzgerald** has been named Cleveland district office sales engineer. Since 1948 he has worked in production, steel pricing and statistical sales before recently completing the sales program. **John Szuhay,** formerly sales engineer in the Cleveland office, has been transferred to Pittsburgh. He joined the company in 1953.

James K. McLaughlin has been named general sales manager, Magnethermic Corp., Youngstown, Ohio, succeeding **P. W. Morse.** Mr. McLaughlin was engaged in engineering and field service with the company for three years before entering sales in 1954. **Peter A. Hassell,** who joined the company in 1954 as manager of the high-frequency division sales department, has been appointed assistant general sales manager.

James M. Ver Meulen has been named president, American Seating Co., Grand Rapids, Mich., succeeding **H. M. Taliaferro,** who has become chairman of the board. **Rich-**

Circle 614 on Page 51→

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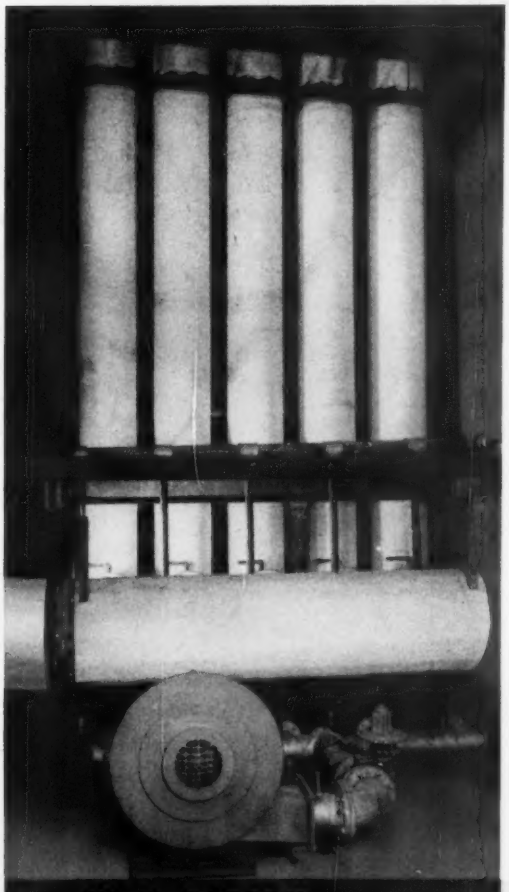
500° TO 1200°



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Grafton, Ohio

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2. **Better control of hot metal temperature**
3. **Silicon oxidation losses reduced**
4. **Improved sulphur control**
5. **More rapid heating**
6. **Increased metal production**
7. **Hotter iron at the mold**
8. **Production of better castings**
9. **Metal charge can be of lower quality**

Get the Facts -

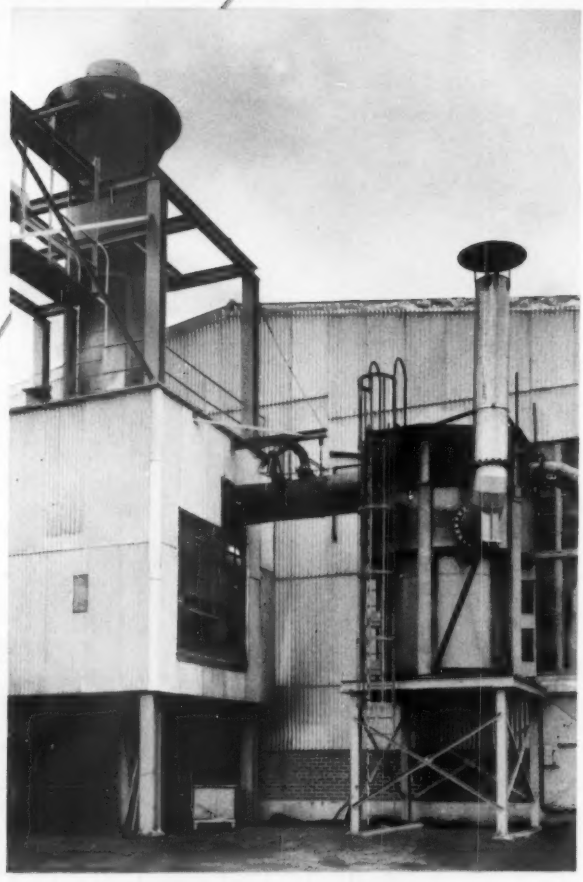
THE BROWN THERMAL DEVELOPMENT CO.

Subsidiary of Brown Fintube Company
Elyria, Ohio

Litho in U.S.A.

BROWN Thermal Preheaters HOT BLAST AIR

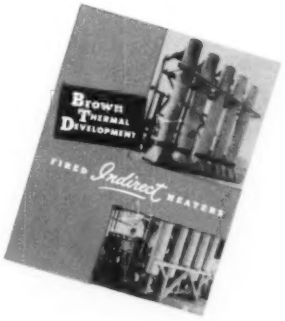
At 1200° F. for



James B. Clow & Sons Coshocton, Ohio

In November, 1957, the Brown Thermal Development Company installed a 6,000 cubic foot Hot Blast Preheater at the James B. Clow & Sons Plant, Coshocton, Ohio. This unit is now furnishing hot blast air up to 1200° F. Units like this offer foundries the following advantages:

- A return of up to 30% in coke savings a year is possible.
- Use of Brown's Fintubing application, to increase surface area, which reduces physical size of preheaters and assures higher efficiency.
- Unique counter-flow principle to obtain ultimate in thermal efficiency.
- A completely packaged unit including burners, controls and safety devices.
- Fully automatic for ease of operation.
- Completely instrumentated for accurate temperature control.
- Large capacity (6,000 to 15,000 cfm up to 1200° F.)
- Backed by 20 years of heat transfer engineering.



YOURS FOR THE ASKING
Learn how Brown Thermal Hot Blast Heaters can slash coke costs and produce better castings. Write for complimentary copy of Bulletin No. 586.

BROWN THERMAL PREHEATERS

THE BROWN THERMAL DEVELOPMENT CO.

Subsidiary of Brown Fintube Company Elyria, Ohio

● CARL E. ROWE
. . . Milwaukee Valve pres.

● C. TAYLOR MARSHALL
. . . Pittsburgh Coke v. p.

● E. C. TROY
. . . becomes operations v. p.

● DONALD H. NINOW
. . . becomes branch mgr.

ard L. Lindland, president, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., was named a director.

● **Carl E. Rowe** has been named president, Milwaukee Valve Co., Milwaukee, subsidiary of Controls Co. of America, Schiller Park, Ill. He joined the company less than two years ago as assistant general manager and until recently was vice president-general manager. He was previously associated with Pressco Casting & Mfg. Co., Chesterton, Ind., and for a time managed his own firm, Carl E. Rowe & Co., Milwaukee, as a technical and management consultant.

Frank E. Wartgow recently joined Marquardt Aircraft Co., Ogden, Utah Div., as technical liaison representative on castings and forgings for its Manufacturing Engineering Department. Mr. Wartgow was formerly associated with Aircraft Engine Div., Ford Motor Co., Chicago.

James N. McEntee has been named Los Angeles branch manager, Yale Materials Handling Div., Yale & Towne Mfg. Co., Philadelphia. Formerly Los Angeles sales manager, Mr. McEntee succeeds the late Eric B. Insley.

R. H. Wellington has been appointed assistant to the president, Griffin Wheel Co., subsidiary of American Steel Foundries, Chicago. Mr. Wellington was formerly general sales manager of the company.

Harry J. Schum and **K. Frank Larkin Jr.** have been appointed sales representatives in the New York district sales office recently opened by Lewis-Shepard Products Inc., in North Bergen, N. J.

● **C. Taylor Marshall,** general manager, Coke & Iron Div., Pittsburgh Coke & Chemical Co., Pittsburgh, has been elected a vice president. Mr. Marshall previously served as supervisor of raw materials and assistant to the executive vice president. He became manager of the division in 1955.

● **E. C. Troy** has been named vice president in charge of operations, Pennsylvania Electric Steel Casting Co., Hamburg, Pa. A graduate of Michigan College of Mining and Technology, he was associated with Detroit Steel Casting Co., Detroit, until 1937, when he joined Dodge Steel Co., Philadelphia. Since 1948, when he resigned as vice president-research and development for Dodge Steel, he has been a process consultant and manufacturer's representative. Mr. Troy is a past chairman of the Philadelphia Chapter of the American Foundrymen's Society and a past national director of AFS.

William P. Cornelius, for the last eight years general manager of the Houston office, Giffels & Vallet Inc., Detroit, recently joined Bernard Johnson & Associates, Houston, consulting engineers.

John M. Kane, manager, Dust Control Div., American Air Filter Co., Louisville, Ky., has been elected a director of the American Industrial Hygiene Association.

William Clausen has been named president, Aluminum Industries Inc., Cincinnati, succeeding **Harrison O. Ash,** who has become chairman of the board of directors. Mr. Clausen was formerly executive vice president - general manager, General Metals Corp., San Francisco.

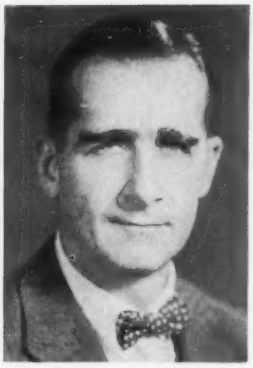
● **Donald H. Ninow** has been named manager of the Moline, Ill., branch, American Air Filter Co., Louisville, succeeding **Frank Tyler,** retired. A graduate of Alabama Polytechnic Institute, Mr. Ninow has been associated with the company since 1948.

K. H. Hobbie has been elected vice president and a director, Driver-Harris Co., Harrison, N. J. **W. Paul Smith** and **E. J. Davies** have been named assistant vice presidents. Mr. Hobbie joined the Chicago sales force in 1926 and became sales manager last year. Mr. Smith, for the last year assistant sales manager, has been with the company since 1923, and has spent over 15 years in sales. Mr. Davies, whose new appointment makes him manager of manufacturing, joined Driver-Harris in 1923 and became general superintendent in 1939.

John G. Khoury has been appointed Detroit district manager, Sterling Grinding Wheel Co., Tiffin, Ohio. A graduate of Brooklyn College, Mr. Khoury also attended Rutgers University and has been in the abrasive engineering field for many years.

A. J. Rumely Jr. has been named president-treasurer, LaPorte Foundry Co., LaPorte, Ind., succeeding his father, **A. J. Rumely,** who founded the company in 1916 and has become board chairman. The new president joined the company in 1934 and has been vice president-general manager for the last 10 years. **Paul Menkhaus** is the new vice president-general manager. **Frank O. Borg,** formerly assistant superintendent, has become foundry superintendent, a position Mr. Menkhaus has held since 1951. **E. A. Miller** continues as secretary.

PHILLIP E. LANKFORD
President



M. E. NEVINS
First Vice President

ELMER G. BRUMUND JR.
Second Vice President

HERBERT F. SCOBIE
Executive Secretary

Non-Ferrous Founders' Society

Holds 15th Anniversary Meeting

MARKETING, mobilization, the National Defense Executive Reserve, and costs were among the highlights of the 15th anniversary program of the Non-Ferrous Founders' Society, held in the Carter Hotel, Cleveland, May 18-22.

Combining management sessions, board and executive committee meetings, and a breakfast for NFFS Management Group officers, this year's meeting also included a meeting and luncheon of the newly formed Cast Bronze Bearing Institute, an affiliate of the Society. Presiding at the annual board meeting was Charles J. Egetter, president, Crown Brass Mfg. Co., Alhambra, Calif., and president of NFFS during the past year.

New Officers—The following officers were elected: President, Phillip E. Lankford, partner, East Birmingham Bronze Foundry Co., Birmingham; first vice president, M. E. Nevins, president, Wisconsin Centrifugal Foundry Co., Waukesha, Wis.; second vice president, Elmer G. Brumund Jr., vice president, Brumund Foundry, Chicago. Herbert F. Scobie, executive secretary, Evanston, Ill., continues as secretary-treasurer. Miss Florence M. Guernier, Highland Park, Ill., was named assistant secretary-treasurer.

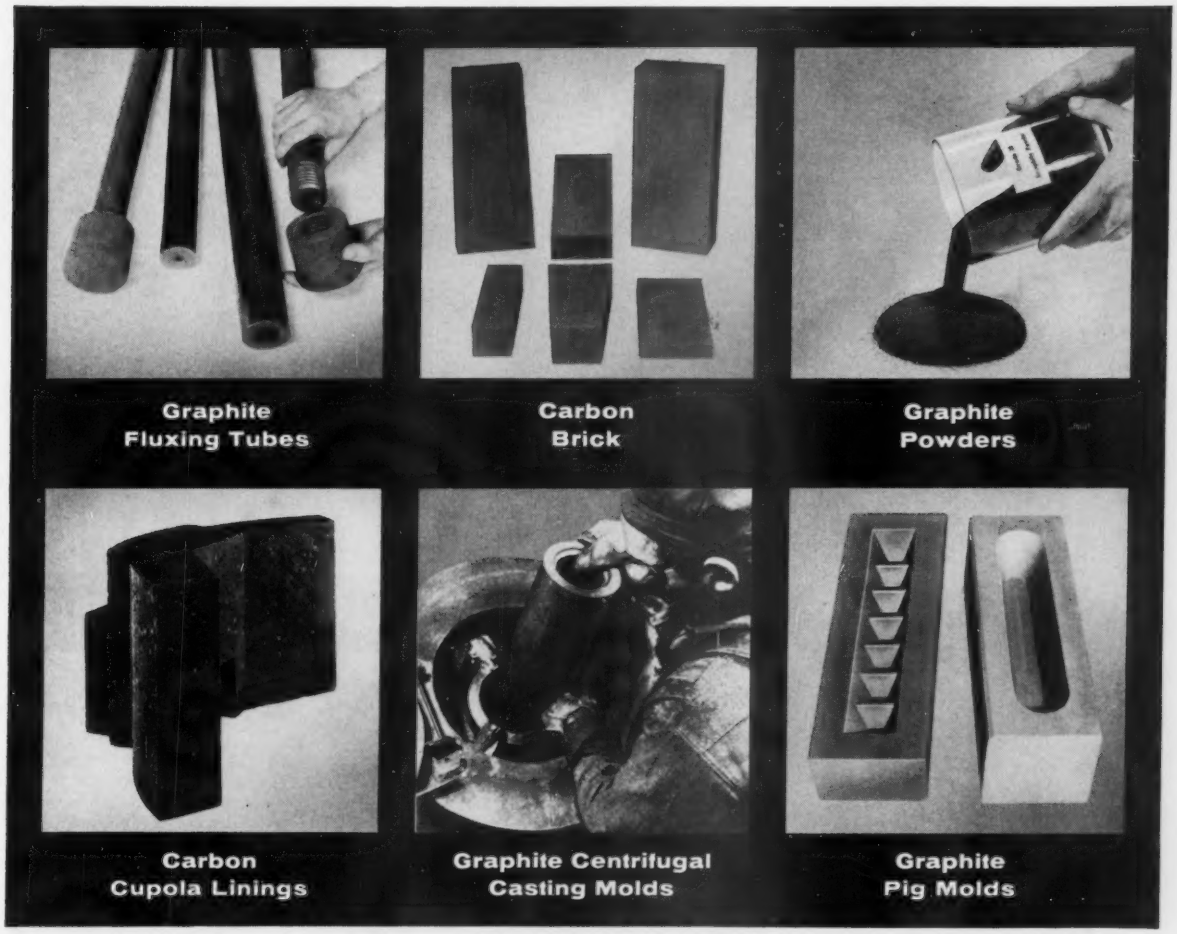
Re-elected national directors for a second three-year term are: A. J. Messmer, Messmer Brass Co., St. Louis; James H. Brennan, Pittsburgh Brass Mfg. Co., Pittsburgh; R. W. Sweitzer, I. S. Spencer's Sons, Inc., Guilford, Conn., and Phillip E. Lankford, East Birmingham Bronze Foundry Co., Birmingham. Incoming directors are William Grimm, William Grimm Foundry, Philadelphia; Joseph R. Accetta, Whitehead Brass Foundry Inc., Brooklyn, N. Y.; Leon Morel Jr., Morel Foundry Corp., Seattle; and Dan A. Mitchell, Progressive Brass Mfg. Co., Tulsa, Okla.

Luncheon Session — Speakers at the government-industry luncheon from the Business and Defense Services Administration, Department of Commerce, were A. A. Snow Sr., director of the Aluminum and Magnesium Division, and William H. Franklin, chief, Industry Operations Branch, Copper Division. The new National Defense Executive Reserve trains industrial personnel for government service in key civilian positions during a national emergency, Mr. Snow explained. He pointed out that the improvisation required in previous emergencies, when the government had to turn to industry for additional executive talent, would be totally inadequate in the light of a possible sudden emergency of unprecedented magnitude.

Mr. Franklin, speaking for William A. Meissner Jr., Copper Division director, who was unable to attend due to illness, said that 1958 should be as good a business year as 1956, but warned that salesmanship would be required. He urged the society to match its excellent cost accounting program with a market research program of like quality. Raw material prices and labor costs will remain high, so there is a constant challenge to improve efficiency and to develop new sales opportunities, he asserted.

Release the resources of your people to learn what co-operation is, said Dr. George D. Heaton, Matthews, North Carolina, NFFS annual banquet speaker. The one thing that keeps a company competitive is measured in terms of people, not machines or materials, he declared. Every man in a plant,

The trend is to carbon and graphite!



NATIONAL CARBON AND GRAPHITE PRODUCTS ARE FAVORITES THROUGHOUT THE FOUNDRY!

When your operations require refractories to handle molten metals inside and outside the cupola...injection of electric furnace graphite powders in connection with desulphurization or for carburization of gray iron...or graphite molds for centrifugal castings and pigging, you'll realize big dividends from "National" carbon and graphite products.

The reasons?

Carbon and graphite refractories have no melting point...resist slag and thermal shock ...are not wet by molten metal...have low thermal expansion...and maintain mechanical strength at elevated temperatures.

"National" graphite fluxing tubes are the accepted standards in the degassing of molten non-ferrous metals. They are also used to inject tailor-made "National" graphite powders and particles during the carburization of gray iron. Powders are available in unlimited quantities in 65 lb. 3 ply and 5 ply bags and 100 lb. and 400 lb. fibre drums.

Use these "National" carbon and graphite products throughout the foundry...you'll cut down maintenance, speed up production and save money.

"National" and "Union Carbide" are registered trade-marks of Union Carbide Corporation

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Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. *In Canada:* Union Carbide Canada Limited, Toronto.

Circle 615 on Page 51

DISTRIBUTORS CENTERED FOR SERVICE!

When warehouse quantities of Iron Foundry Alloys are required in a hurry – there's a Vanadium Corporation Distributor right in your area

Adequate stocks of Vancoram products for every foundry need are within easy reach of you. For fast service, call your nearest warehouse.

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J. M. TULL METAL & SUPPLY CO., INC. – Atlanta, Ga., Jacksonville, Miami, Tampa, Fla., Birmingham, Ala.

WHITEHEAD METAL PRODUCTS COMPANY, INC. – New York City, Buffalo, Syracuse, Albany, Schenectady, Rochester, Philadelphia, Lancaster, Allentown, Baltimore, Harrison, N. J., Hartford, Windsor, Conn., Cambridge, Mass., Richmond, Va.

WILLIAMS & COMPANY, INC. – Pittsburgh, Cleveland, Cincinnati, Columbus, Toledo.

VANCORAM PRODUCTS FOR THE IRON FOUNDRY INDUSTRY

FERROCHROMIUM – High Carbon, Low Carbon, EXLO®, Ferrochrome-silicon, EXOKROM® (Exothermic Ferrochromium).

FERROSILICON – All grades.

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SPECIAL ALLOYS – Graphidox No. 4, V-5 Foundry Alloy, NODULOY® Alloys, INOCULOY® Alloys.

BRIQUETTES – Ferrosilicon, Ferrochromium, Ferromanganese, Silicomanganese.

There's Always That Extra Margin of Quality in the Vancoram Green Drum!

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Producers of alloys, metals and chemicals

Circle 624 on Page 51

within the range of his own experience, can contribute to the solution of problems.

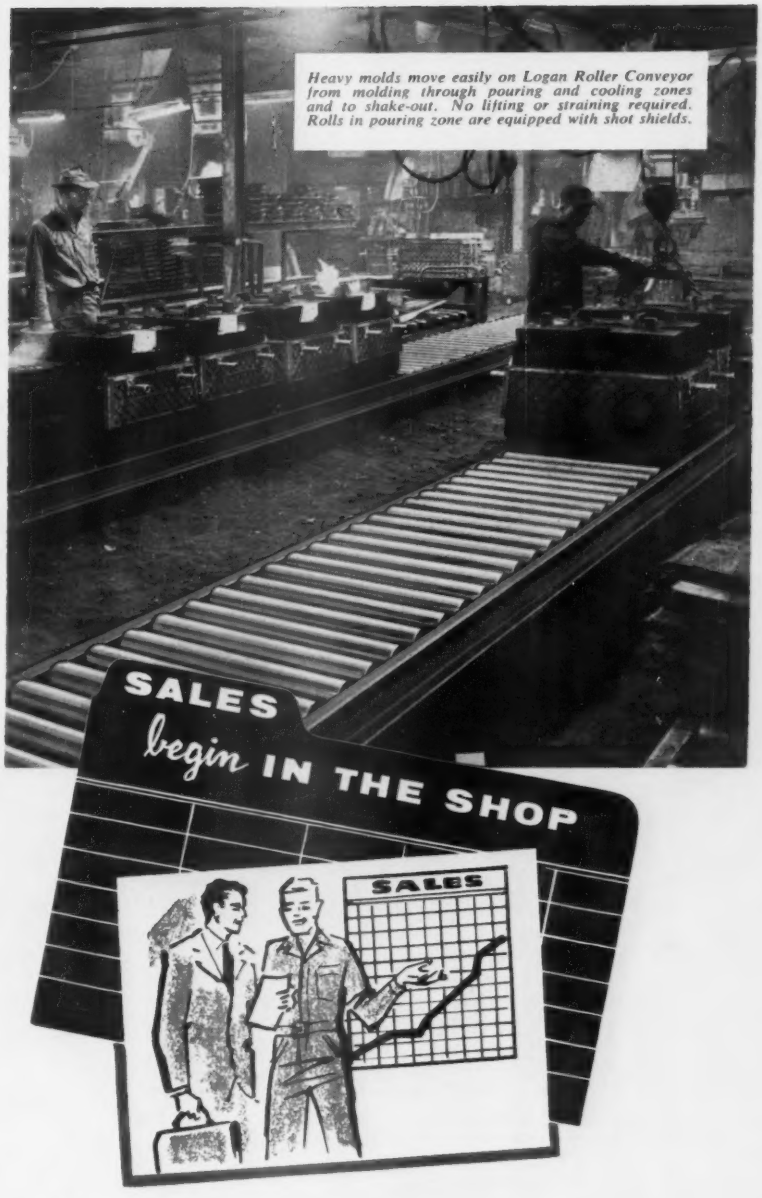
Other speakers and their subjects were: "Supervisory Incentives," John W. Horner Jr., Slack-Horner Brass Mfg. Co., Longmont, Colo.; "How to Get Your Share of the Market," Richard C. Meloy, marketing director, Gray Iron Founders' Society, Cleveland; and "Impact of Pension Trust Costs," Ted Snyder, Russell M. Tolley & Associates, Indianapolis. A dramatization of selling techniques prepared by H. A. White, Smeeth-Harwood Division, Capital Brass & Aluminum Foundry Co., Chicago, featured Walter M. Clark, D. W. Clark & Co., East Bridgewater, Mass., as purchasing agent, and George T. Fischer, Fischer Casting Co., Dunellen, N. J., and James F. Gilbert, Gilbert Brass Foundry Co., St. Louis, as salesmen.

Panel Discusses Cost Groups

Panelists in a session entitled "How Cost Groups Help Management" were: William A. Gluntz Sr., Gluntz Brass & Aluminum Foundry Co., Cleveland; Edward J. Metzger, Multi-Cast Corp., Wauseon, Ohio; Urban von Rosen, Soloway & von Rosen, Cleveland, NFFS national cost consultant; and Eugene M. Hinze, E. T. Runge Associates, Cleveland. The panel not only brought out the recent workings of local and national cost groups, but also plans for regional cost clinics and a correspondence course in nonferrous foundry cost accounting.

During the Castings Congress and Show of the American Foundrymen's Society held in the Cleveland Public Auditorium May 19-23, the Non-Ferrous Founders' Society exhibited castings produced by member firms and recorded requests from castings users for the 1958 NFFS Castings Buyers' Guide to be issued soon.

Bearing Institute — The Cast Bronze Bearing Institute, organized earlier this year as an affiliate of the Non-Ferrous Founders' Society, heard George Robinson, chief, Friction and Lubrication Section of the Franklin Institute, Philadelphia, report on the development of the CBBI technical manual for users and designers of cast bronze bearings. Due to lack of adequate, readily available information on sleeve bearings, Mr. Robinson stated, there are innumerable examples of the use of rolling element type bearings, to the detriment of the performance of the equipment in which they are used.


Heavy molds move easily on Logan Roller Conveyor from molding through pouring and cooling zones and to shake-out. No lifting or straining required. Rolls in pouring zone are equipped with shot shields.
SALES
begin IN THE SHOP
SALES

Locating ways to cut costs, always a good practice, becomes even more important as competition increases. A "head-to-toe" examination of every element of cost is the order of the day. Many companies are reducing operating expenses through improved materials handling.

Logan Conveyors, with built-in engineering "extras" are being called upon to solve handling problems for economy minded firms of all sizes. Most users report immediate savings in effort, time and space — savings that have materially strengthened their selling position. Certainly there is much to support those who believe that *sales do begin in the shop.*

Write today for more information or for nearest engineer to call.

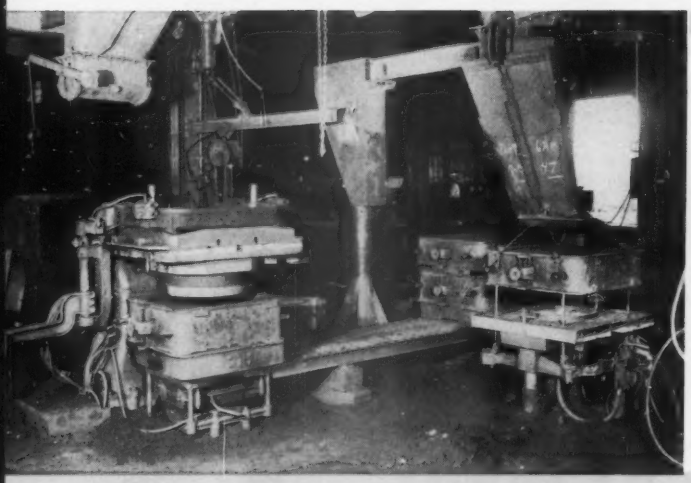
LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KY.

Logan Conveyors

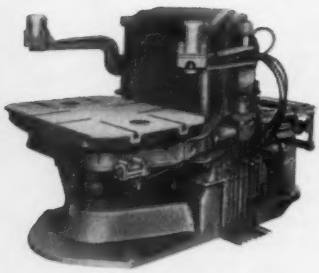
Circle 617 on Page 51

For efficient production of molds and cores

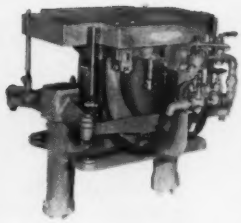
OSBORN...THE COMPLETE LINE OF PRECISION-BUILT MACHINES



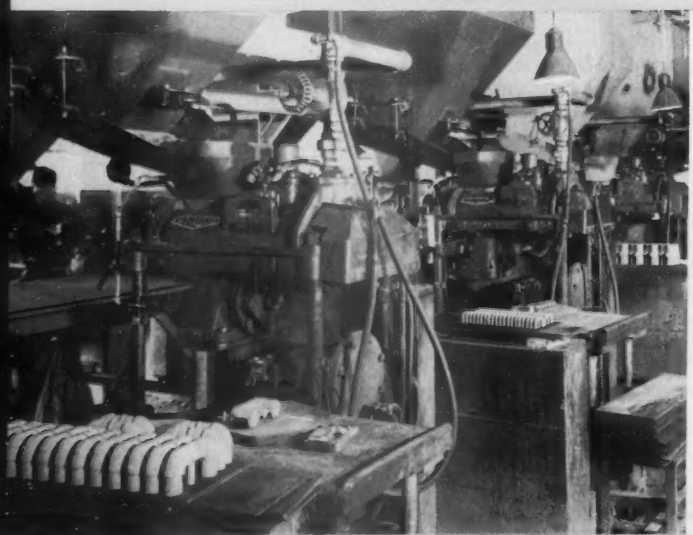
Osborn No. 643 Jolt Rockover Draw (left) makes drags.
Osborn No. 540 Jolt Stripper (right) makes copes.



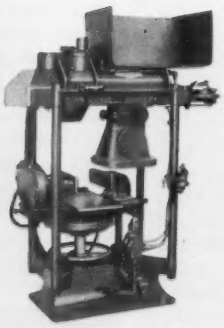
JOLT ROCKOVERS



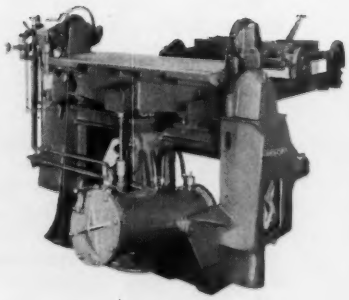
JOLT STRIPPERS



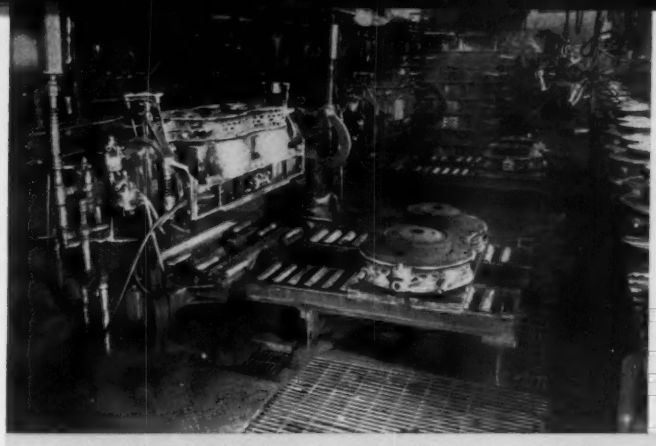
Osborn Diaphragm type core blower with automatic controls producing cores for pipe fitting molds.



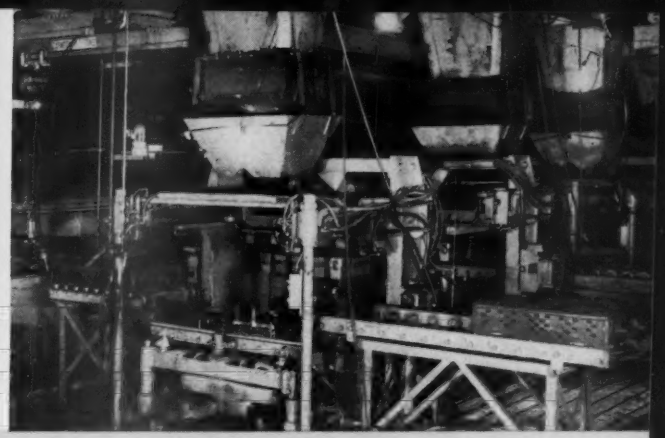
CORE BLOWERS



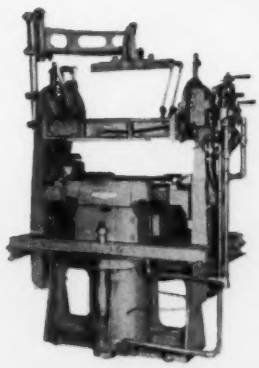
JOLT ROLLOVERS



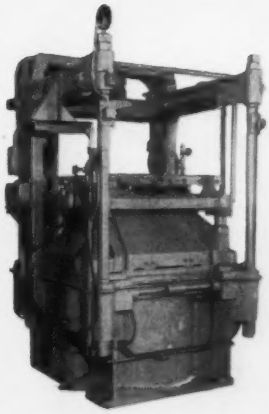
Osborn No. 333 Jolt Rollover Squeeze making large drag molds.



Osborn No. 1230 Jolt Squeeze Strippers making drags and copes for automotive cylinder heads.



JOLT ROLLOVER SQUEEZERS



JOLT SQUEEZE STRIPPERS

OSBORN ROTA-LIFT

SQUEEZERS Post Type

SQUEEZERS Portable

For continuous, low-cost operation

You can count on longer, more efficient service from Osborn machines because:

1. Osborn machines are designed to take it. Their rugged, heavy-duty construction assures you long, dependable operation under the severest conditions.
2. Osborn machines are easier to maintain. Service parts are precision-manufactured, are completely interchangeable to permit installation on Osborn machines without additional fitting.

Osborn machines are also available with automatic controls for higher production requirements. Information on any Osborn molding machine or core blower is available by writing The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.

THE OSBORN MANUFACTURING COMPANY
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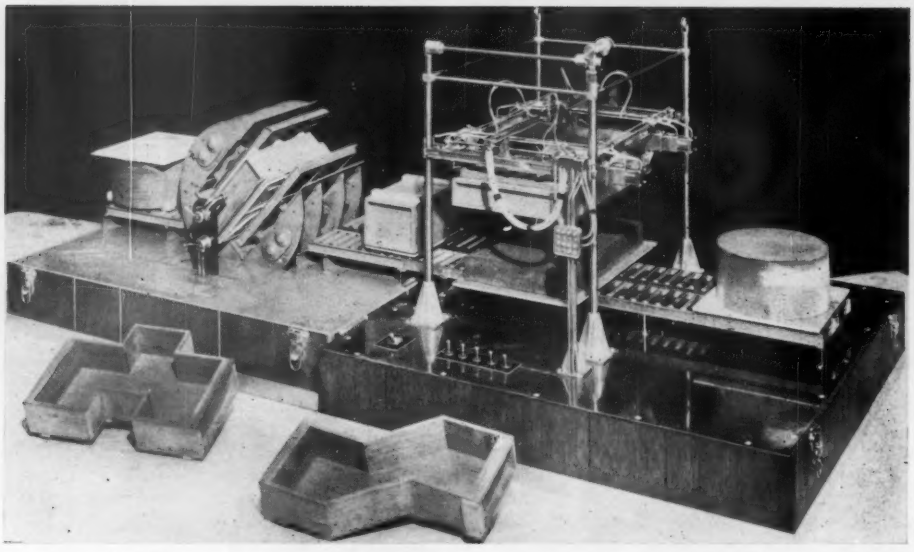
MOLDING MACHINES CORE BLOWERS
INDUSTRIAL BRUSHES

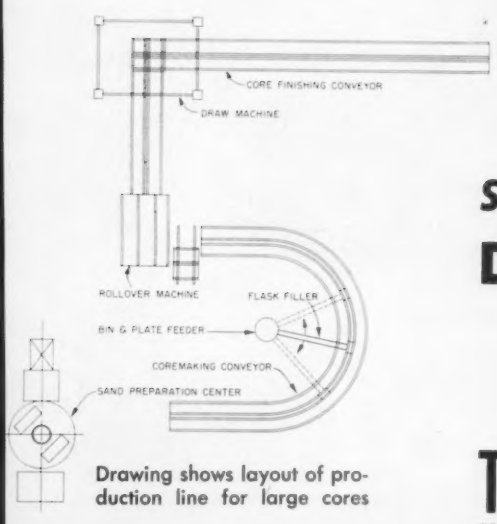
Another example of Osborn leadership and advanced engineering

Circle 618 on Page 51

Osborn Jolt Squeeze molding machines are available with wheels or pedestal base.



Models of the core rollover machine (at left) and core draw machine. Each of the models is made to scale and is fully operative



Drawing shows layout of production line for large cores

Scale Models Aid in DESIGNING MACHINES

By ROBERT H. HERRMANN
Associate Editor

TWO new machines, a rollover and a draw, form the basis of a mechanized but flexible large-core production line at Greenlee Bros. & Co., Rockford, Ill. These machines have different backgrounds. The rollover started out as an all-metal working model made in the home workshop of one of the company engineers who has strong "do it yourself" inclinations. Drawings made from it were used to construct the full-sized machine. With the model constantly available for reference, the full-sized machine was constructed in a short time with a minimum of "bugs." They were worked out in the model.

The pushbutton-controlled rollover machine is designed to handle coreboxes or flasks of any shape or size up to 5 ft wide and 10 ft long and between 8 and 32 in. deep. It has a capacity of 7000 lb and operates on air at 90 psi, with the clamping and rollover cycle actuated by lever controls. Clamp, rollover, and roll back cycle time is 45 seconds. The machine is mounted in a pit which can be varied in depth to permit handling cores at floor level or at elevations up to 18 in. above the floor. If the machine were mounted at floor level, it would discharge at 41 in.

The rollover resembles a barrel with circular metal discs instead of hoops and with a rectangular opening cut through them the length of the barrel. The discs ride on flanged wheels driven by an air motor. Friction drive thus created rotates the barrel. The two faces of the opening into which the box is rolled act as opposed clamping heads. Each has a maximum travel of 12 in.—that is, a total clamping travel of 24 in. Movement is provided by an air cylinder through roller chain, sprocket, shaft, rocker arms, and bell crank. The

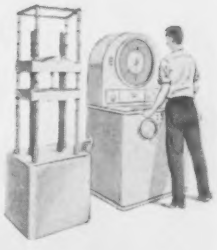
Box tip-up device used to raise coreboxes from floor to conveyor

"I always get good ductility using calcium alloys"

Steel foundries employing aluminum deoxidation obtain improved properties by making a supplementary addition of calcium-silicon or calcium-manganese-silicon to the ladle. These calcium alloys help obtain consistently good ductility in the tensile test. Many foundries also report improved fluidity with the calcium additions. Generally 3 to 5 lbs. of alloy per ton insure effective treatment.

ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 East 42nd St., New York 17, N. Y.

Contact your ELECTROMET representative for further information on getting improved ductility with calcium alloys.



Electromet

FERRO-ALLOYS AND METALS

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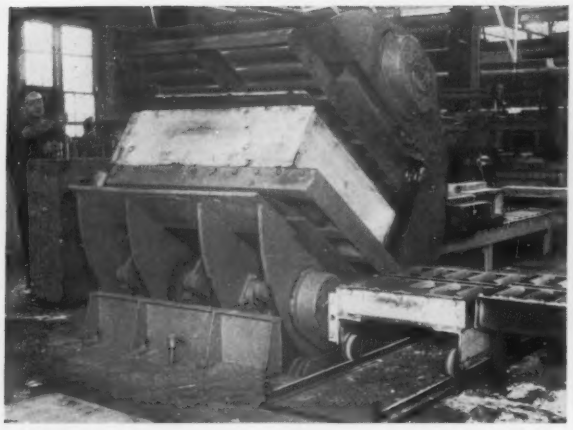
Circle 635 on Page 51



Front view of the core rollover machine shows unit at a point partially through its rollover cycle

Core draw machine with corebox removed from core. Note vibrator in center and on top of the corebox

arrangement provides twice the travel of the air cylinder piston. Roller conveyor sections are mounted on the clamping head surfaces. The conveyors can be mounted to permit rolling the boxes in from either end or the front of the machine and out from either end or back after rollover. The direction of exit may be different from that of entry, depending on installation of the conveyor sections on the jaws of the machine, to meet layout requirements of the foundry.

The Draw Machine—Work may be fed to or removed from any of the four sides of the draw machine. It will handle square, rectangular, or round boxes from 2 in. deep x 12 in. wide x 24 in. long to 36 in. deep x 62 in. wide x 108 in. long. It will draw cores 32 in. high. Boxes are positioned, clamped, gripped, and vibrated by air-cylinder-operated mechanisms at 90 psi. Drawing and lowering are accomplished by electric motor. Pushbuttons control all machine operations.

The unit consists of four upright posts which guide vertical movement of the clamping and draw carriage. Work rolls into the machine on a fixed roller conveyor. If the work is to be taken out of the machine at 90 degrees to entry, an air cylinder raises a second set of rollers mounted between those of the fixed conveyor to accomplish the change of direction. To make the draw, rubber faced, air-cylinder-actuated clamps are brought into position longitudinally by pushbutton control mounted on an electrically driven chain, much like draperies on a traverse rod, and can be positioned to fit the length of any box within the capacity of the machine.

When the clamps are positioned, the carriage is lowered over the work, and self-adjusting, idler air cylinders bring the clamps into contact with the box. Short-stroke, large-diameter air cylinders provide the clamping pressure. With the carriage in clamping position, an air-powered vibrator free floating on a loop of conveyor belting rests on the corebox. After the draw, the core is rolled out of the machine and the box is lowered to the conveyor, released, and rolled out.

Core Production—At the Greenlee foundry, these machines are incorporated into a compactly designed, gravity roller conveyor core production line. A front-end loader brings raw sand from storage to a rectangular, floor-level hopper with a conveyor belt at the bottom to feed a bucket elevator which discharges sand to an overhead feed belt. That belt transfers sand to a weigh hopper over the muller. Limit switches actuated by the weigh hopper control operation of the feed belt.

Batches of prepared sand are discharged from the muller to a belt which feeds a bucket elevator. It

View of various cores that have been run through rollover and draw machines

Cedar Heights superior plastic bonding agents from the world's finest clay deposits hold moisture . . . help produce smooth, clean, undamaged molds with high green strength in less mulling time.

Cedar Heights clays dry out strong with a minimum of shrinkage . . . have a high refractory value to resist erosion, washing and blows.

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A plastic bonding agent produced in No. 8, 12, 16, 20, 30 and 50 meshes.

higher strength . . . better molds

CEDAR HEIGHTS AIRFLOATED CLAY
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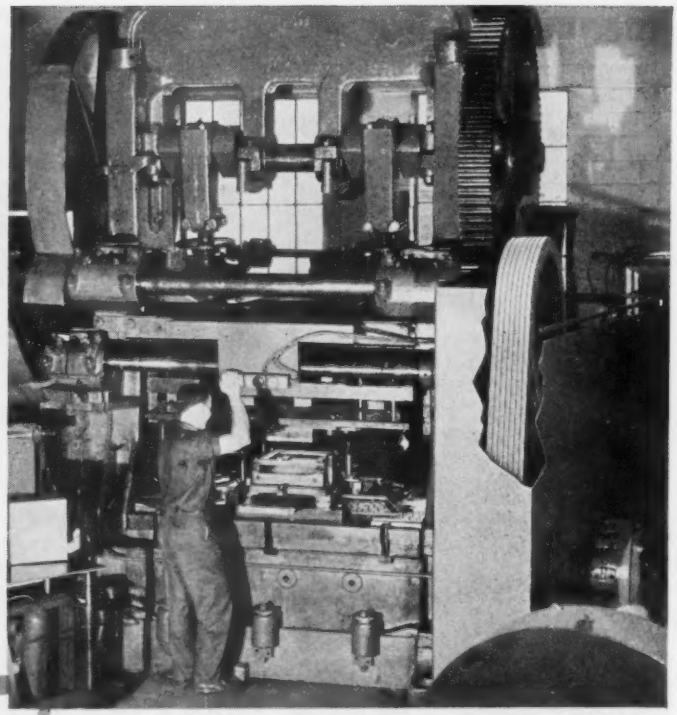
High in refractory value, smooth clean texture. Produced in No. 8, 12, 16, and 20 meshes.

CEDAR HEIGHTS CLAY COMPANY

50 PORTSMOUTH ROAD
OAK HILL, OHIO

Circle 620 on Page 51

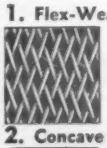
Shock loads no problem for Super V-Belts on punch press



Severe shock loads, which caused standard V-belts to fail, were no problem for Gates Super Vulco Ropes on this punch press.

No other V-belt has ALL these advantages

1. Flex-Weave Cover (U. S. Pat. 2519590)



A Gates exclusive: provides greater flexibility . . . prolongs belt life . . . helps deliver more power to driven machine.

2. Concave Sidewalls (U. S. Pat. 1813698)

Note the concave sides shown in Fig. 1. As belt bends, concave sides become straight, making uniform contact with sheave goove (Fig. 1-A). Even contact means uniform wear . . . far longer belt life.

3. Tough, resilient Tensile Cords

Super strong and resilient; provide 40% greater horsepower capacity . . . easily absorb heavy shock loads . . . reduce number of belts required, save weight and space.

4. High Electrical Conductivity

Built into Gates Super Vulco Ropes for safer drives (in explosive atmosphere).

5. Oil, Heat, Weather Resistant

Made with special rubber compounds, Super Vulco Ropes stand up longer under all conditions.

TPA 315

Gates

World's Largest Maker of V-Belts

Especially designed to handle the heaviest shock loads, Gates Super Vulco Ropes solve tough drive problems—reduce both maintenance and replacement costs.

For example: Mr. Daniel Rusinow, president of the R & D Manufacturing Co., Detroit, Michigan, needed to improve efficiency in a 250-ton punch press. The press was originally driven by flat belts, but these slipped and proved unsatisfactory.

Mr. Rusinow first replaced the flat belt drive with standard V-belts, but the severe shock loads of the punch operation caused the belts to fail.

A superior shock-absorbing drive was needed—the local Gates Field Engineer was consulted, and Super Vulco Ropes recommended for the job.

Mr. Rusinow commented, "After our experience with other V-belts, I did not believe it possible to design such an excellent drive, but Gates engineering service and Super V-Belts proved the right answer to the problem."

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Gates Super VULCO ROPE Drives

40% more Horsepower Capacity

discharges sand to an overhead belt which supplies a hopper over a plate feeder. A swinging, belt-type flask filler pivoted at the center of the plate feeder supplies sand to flasks on a semicircular section of gravity roller conveyor.

An operator moves coreboxes from a floor storage area to a tilting device at one end of the U-shaped roller conveyor. This device tilts the boxes from the floor to the conveyor. Boxes are rolled to the semicircle forming the base of the U, filled with sand from the belt filler, and hand rammed. Cast iron bottom boards are set in place with a crane, and the box is pushed into the rollover machine. Rolled over boxes are pushed out of the machine at 90 degrees to entry and rolled to the draw machine. Empty boxes are rolled out of the draw machine and returned to storage at the head end of the conveyor.

Cores are pushed out to a straight section of conveyor where operators perform finishing operations. A bridge crane transports green cores from the finishing station to any of three car-type, gas-fired baking ovens, measuring 12 ft 6 in. x 20 ft. A fork truck moves cars into and out of the ovens. The bridge crane moves baked cores from the cars to a sand pit in the floor or to benches where they are spray or brush-coated and pasted into assemblies, if that step is required.

The largest cores produced weigh about 4000 lb, the average being 400-500 lb. The foundry produces gray iron castings weighing from a few pounds to 25,000 lb for woodworking, milling, hobbing, and automatic screw machines and for special transfer machines for the automotive industry. About 60 per cent of the castings produced are used in equipment manufactured by Greenlee.

Publishes Abstracts Covering Rare Earths' Applications

Abstracts of world literature on metallurgical applications of rare earths to ferrous and nonferrous materials have been incorporated in a 46-page publication of Davison Chemical Co. Div., W. R. Grace & Co. Applications include those in nodular iron, cast and wrought stainless steels, aluminum and magnesium alloys, chromium and nickel-base alloys, etc. Entitled "Metallurgical Applications of the Rare Earths," it may be obtained by letter-head application to Davison Chemical Co., P. O. Box 488, Pompton Plains, N. J.

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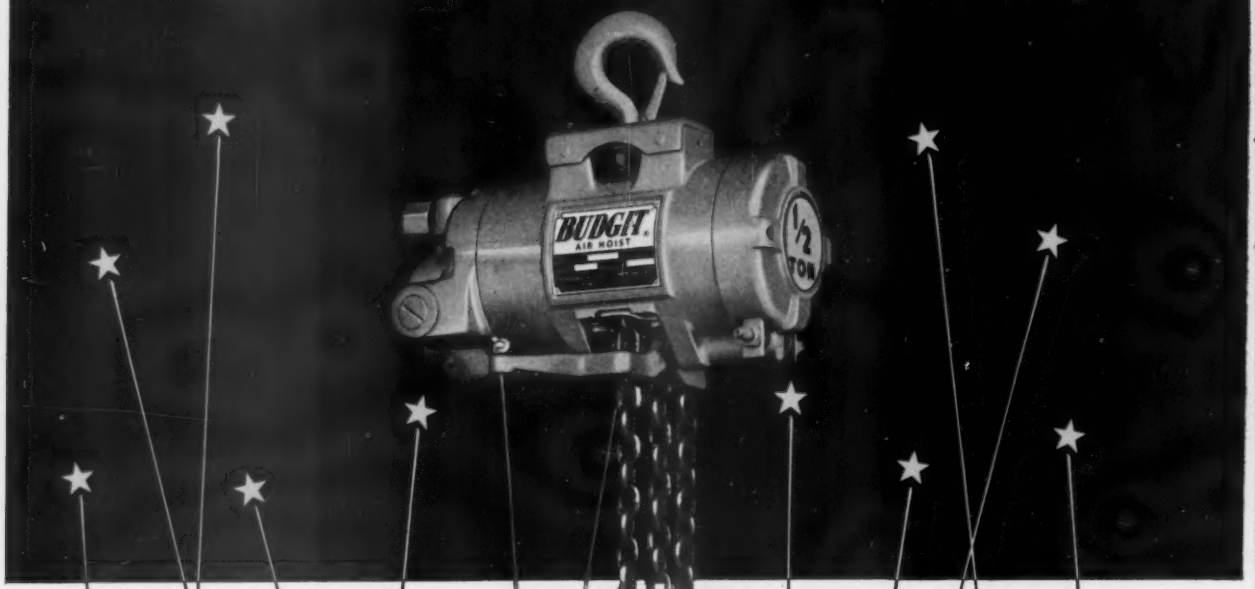

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Capacities:	500 lbs.	1000 lbs.	2000 lbs.
Speed FPM:	0-75	0-40	0-20
Weight:	27 lbs.	27 lbs.	40 lbs.

Lift: 10 Feet, Standard. Operating Pressure: 80 psi.

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New air hoists handle tough production lifting jobs safely and quickly wherever atmospheric conditions are hazardous, corrosive, extremely hot, dirty or wet. Soon pay for themselves, then continue saving for years to come.

Built into 'Budgit' Air Hoists are fine quality and operational advantages comparable to those long associated with 'Budgit' Chain Blocks and Electric Hoists. Many features unique in air hoist design insure safe, trouble-free performance in the worst conditions of service imaginable.

Variable speed control puts precision accuracy into spotting loads. You merely manipulate the handles on the control cords to get instant lifting or lowering action from creep to top speed.

Far quieter operation. The only air hoist with a muffler to mute exhaust noise that tires workers.

Compact and light. Much lighter than most other air hoists. Special aluminum alloy frame and housing combine lightness with rugged strength.

Fewer moving parts, plus accurate machining, assure long life for the heavy-duty vane-type motor without costly maintenance.

Safe to use anywhere. Explosion-proof motor is ideal for use where atmosphere is hazardous. Motor won't burn out – overloads can't damage it.

Automatic load brake is shoe-type. Acts instantly when air pressure to motor is cut off – holds the load safely. Easily adjusted externally.

Finest gearing made. Highest efficiency Equa-Torque spur-gearing distributes the load on two sets of teeth in each gear for extra safety. Heat-treated machine cut teeth mesh accurately, wear longer. Operation is smooth on ball or roller bearings.

Tough load chain with safety hooks. Nickel steel *roller* chain will not stretch or bind. Heat-treated alloy steel *link* type chain especially tough for severe hoisting service. Forged steel safety hooks swivel freely through 360° – securely lock hoist and load in center of hook saddles.

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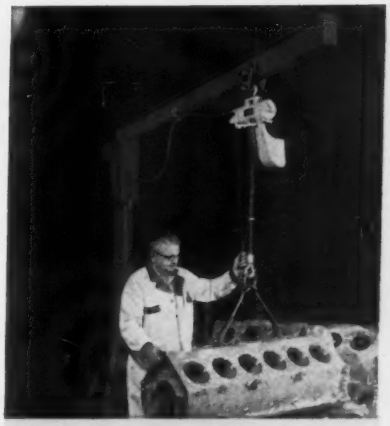
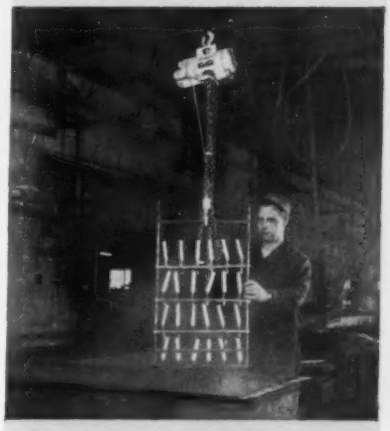
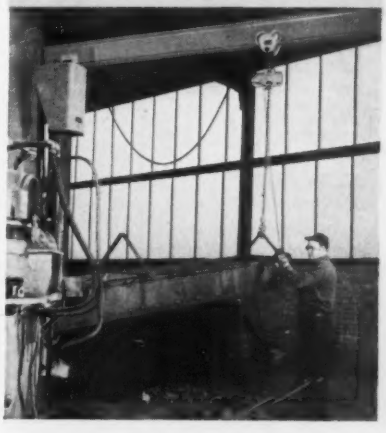


'BUDGIT' AIR HOISTS



'BUDGIT' AIR HOISTS



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Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties.

Circle 623 on Page 51

Institute of British Foundrymen

Meets in 55th Annual Conference

ARTHUR E. PEACE
President

THE 55th annual conference of the Institute of British Foundrymen was held May 13-16 at Buxton, Derbyshire. Organized by the East Midlands Branch, under the chairmanship of J. W. Gardom, it was held a month earlier than usual, but experienced the same mixture of sun and rain as is the common lot of many conferences. It included two separate days for works visits.

After an enjoyable reception by the Mayor and Corporation of Buxton on Tuesday evening, the conference settled down to business on Wednesday morning. The annual report of the Technical Council was presented by M. M. Hallett and supported by D. V. Atterton. Particular attention was drawn to publication of the book *Typical Microstructures of Cast Metals*, for which there had been a heavy demand. Among recently formed committees, those dealing with cupola developments, methods of feeding, coke quality, and comparison of melting methods were reported to be making particularly rapid headway.

CHARLES H. WILSON
Senior Vice President

G. R. SHOTTON
Junior Vice President

Medal Awards—The award of medals followed. The E. J. Fox Medal was awarded to P. A. Russell, S. Russell & Sons Ltd., for his many years of distinguished services to the industry and the institute. M. M. Hallett, Chamberlin & Hill Ltd., was awarded the Oliver Stubbs Medal for the presentation of many papers to the institute and for services to the Technical Council.

The Meritorious Services Medal was awarded to Vincent Delport, for many years European editor of FOUNDRY (*Editor's Note*: Mr. Delport died on June 3. See p. 147). High tribute was paid to his long and distinguished services to the institute and to the International Committee of Foundry Technical Associations. Mr. Delport was unable to receive his medal personally, and it was presented to Dr. A. B. Everest for transmittal. A second award of the Meritorious Services Medal was made to G. D. Thompson for his work in founding and building up the Australian Branch of the IBF. Mr. Thompson also was unable to be present. The British Foundry Metal for the best paper of the year was presented to C. W. Hicks, Rolls-Royce Ltd., for an outstanding paper on the manufacture of aircraft engine castings.

Election of Officers—After the awards, new officers were elected. Retiring President John Blakiston invested Arthur E. Peace, who had been senior vice president, with the presidential chain of office. He referred to Mr. Peace's long and distinguished service to the institute, culminated by his chairmanship of the Technical Council for 12 years. He is a past branch president and represented the institute on numerous committees for many years.

The new president then proposed the election of Charles H. Wilson, who had been junior vice president, as senior vice president for the forthcoming year, and the proposal was supported by J. Vickers. Election of G. R. Shotton, Shotton Brothers (Oldbury) Ltd., to be junior vice president was proposed by S. H. Russell and seconded by J. E. Hurst. This election indicates that the 1960 conference of the institute will be held in the Birmingham area.

Results of the ballot by the general membership to elect five members to the council for 1958-1960 also were announced. Successful members were H. G. Hall, M. M. Hallett, J. Hill, R. F. Horton, and P. A. Russell. Fraternal greetings to the American Foundrymen's Society then were authorized.

The presidential address followed. Mr. Peace remarked that his subject, "Some Aspects of Mold-Making," was in accordance with his desire to consider the actual making of the mold as the main theme of the conference. He pointed out that although the design of castings invariably can be changed to improve productivity, complexity of shape often is the very reason for the existence of a casting. Mold quality is of vital importance in determining not only surface finish, but also dimensional accuracy and consistency of castings. He felt that too little attention is paid to the standard of mold making in this important connection.

Attention was drawn to hardness variations throughout the mold as distinct from hardness variations on the mold surface. Consistency of mold ramming plays an important part in controlling mold dilation, to which much attention recently has been directed regarding its influence on casting soundness and

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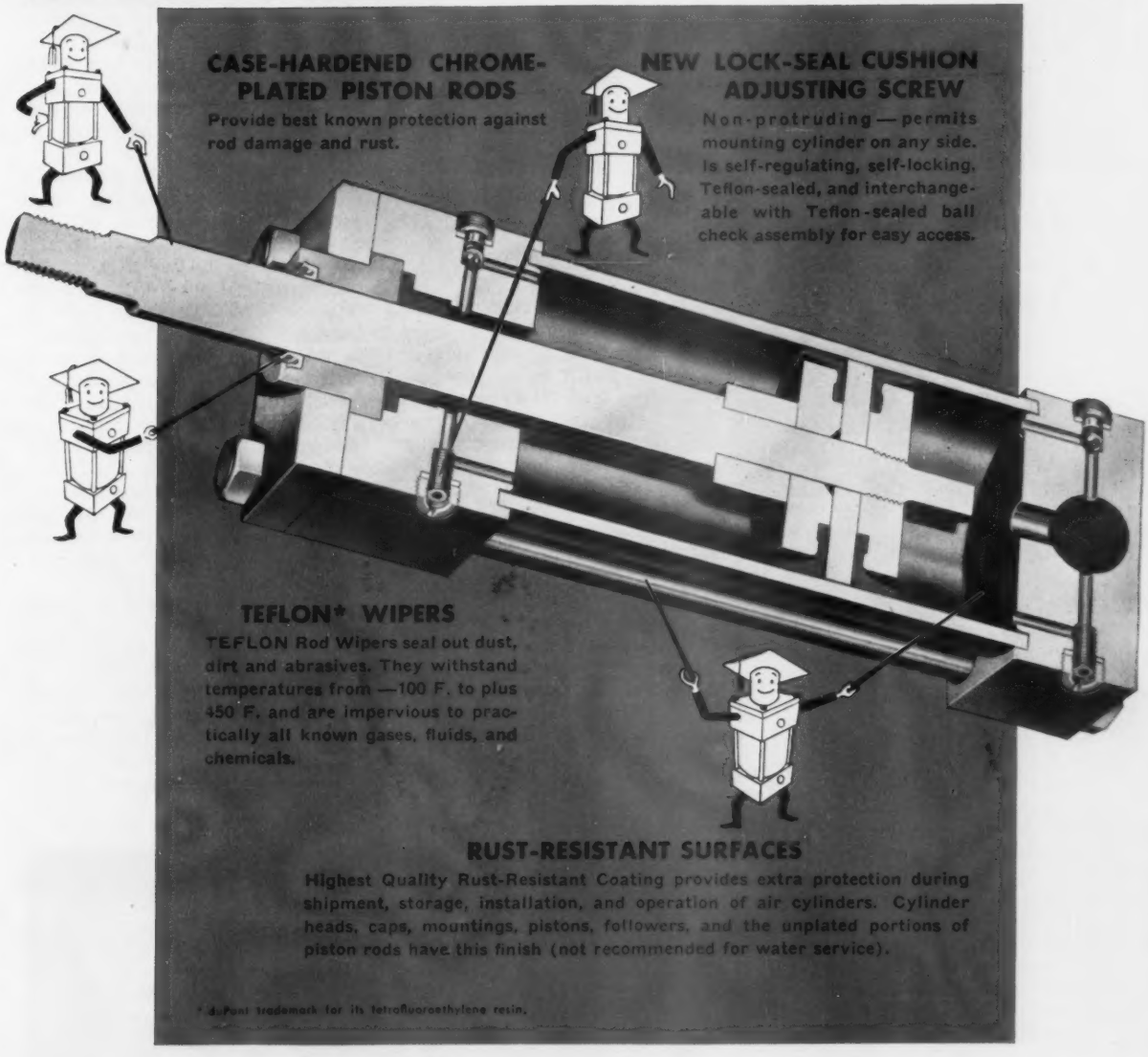

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Miller Air Cylinders are available in 1½" through 20" bores for 250 psi operation. Select from 19 standard mountings, strokes up to 22 feet, single and double rod end, cushioned and non-cushioned, and over-size rod cylinders. Large selection for immediate delivery.

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Circle 602 on Page 51

Arthur Peace, left, new president of the IBF, and Mrs. Peace receive Lord and Lady Hives at the annual banquet. Lord Hives was principal guest

the control of hot tears, in addition to its obvious effect on consistency of dimensions.

Williams Lecture—The annual Edward Williams lecture was delivered by Prof. A. J. Murphy, principal, College of Aeronautics at Cranfield. Professor Murphy is a distinguished worker in the field of the lecture, "Metallurgy and Aeronautical Progress," which dealt with the connection between metallurgical developments and changes in design of aircraft structures.

Although flying machines originally were constructed mainly of organic materials such as leather and wood, the use of metal offered outstanding advantages. At first the aim of metallurgists was to produce materials possessing a high tensile strength to density ratio, as exemplified by such materials as age-hardening alloys of the Duralumin family. The potential advantages of the aluminum-zinc-magnesium alloys had long been recognized, but unfortunately they suffered from stress-corrosion cracking. It was not until 1937 in England that a satisfactory alloy, RR77, first was put into production, followed a little later by alloy 75S in the USA.

After World War II, much longer service lives were expected of aircraft, and the consequent growing importance of fatigue resistance soon was recognized both in England and in America. It was found that some of the alloys which possessed outstanding tensile strength/density ratios, did not possess satisfactory fatigue properties and were highly susceptible to stress concentrations and, therefore, to the rapid propagation of fatigue cracks. This sensitivity was not fully understood, but it was believed to be due to over-aging at the root of a notch induced by the local plastic deformation.

Naturally aged Duralumin showed better fatigue characteristics in regard to notch sensitivity and the rate of propagation of cracks than did the materials of higher tensile strength/density ratio, and it is the task of aircraft metallurgists to evolve materials showing a better combination of these various requirements.

The theme of mold making was continued in many other papers presented to the conference. The report of T.S. 48, under Chairman Dr. D. V. Atterton on "Surface Finish of Nonferrous Castings," discussed some theoretical possibilities and described a method of assessing surface finish. The latter involves preparation of a series of standards made by casting test pieces against pieces of emery cloth of known grading. Type metal is used to avoid damaging the emery cloth, and the surface of the type metal is an accurate reproduction of the coarseness of the emery. Some of the findings were as would be expected; others were more surprising. The pressure head was shown to have considerable influence in determining surface finish and metal penetration. It also was shown that certain dressings can improve surface finish greatly by nullifying the effect of the head.

The finding that the practice of venting had no significant effect surprised some members, but was confirmed in the discussion. It also was surprising to find that, within reason, pattern quality and the use of green or dry sand had little influence. The report drew attention to the fundamental importance of sand flowability in determining surface finish. Although the work described related only to nonferrous castings, it was felt probable that at least some of the conclusions would be applicable elsewhere.

A paper on the influence of pH variation in foundry molding sand on the surface finish of steel castings was given by D. H. Houseman. It did not confirm the good results claimed by some American foundries to result from control of the pH value. It was a little difficult to generalize on the subject because sand conditions varied, but exhaustive trials in the author's foundry had not shown any great benefits.

In discussion, it was pointed out

Dr. A. B. Everest, right, receives the Meritorious Services Medal from John Blakiston, retiring president, on behalf of Vincent Delport

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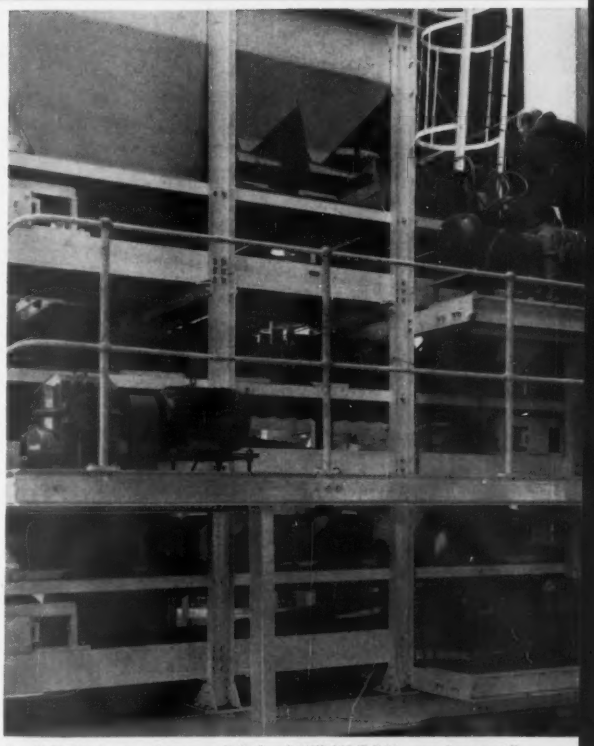
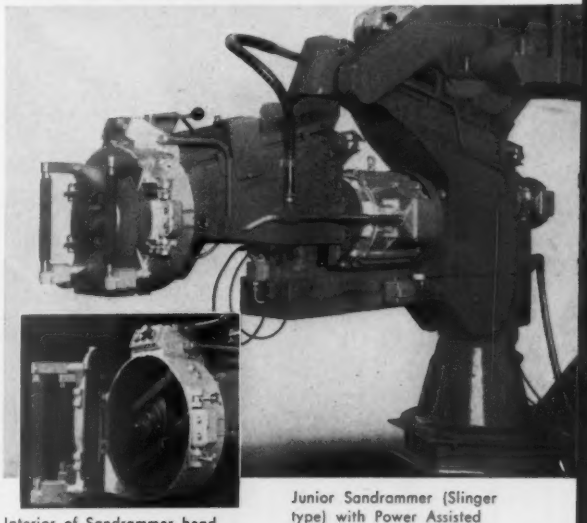


Con-Belt Continuous Conveyor Belt Sand Mill (60 T.P.H. gray iron sand)



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Circle 625 on Page 51

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Nonstop service

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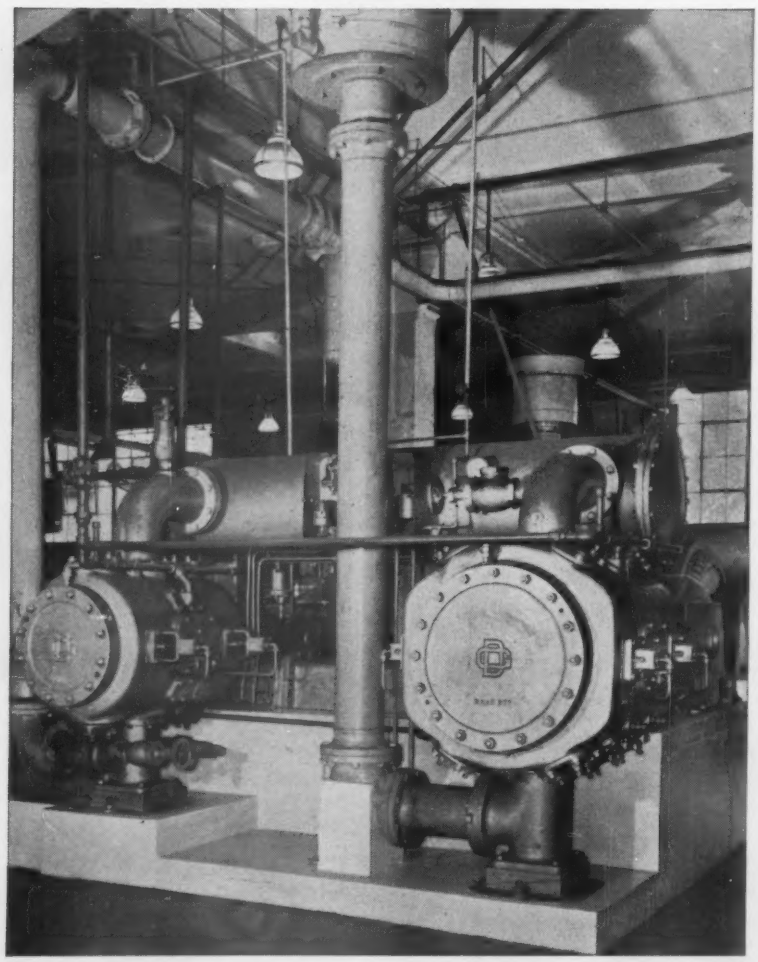

that in certain parts of the world bentonites of acidic character occur and that when they are used additions of sodium carbonate might well be beneficial.

A particularly interesting mention was made of the use of radioactive tracers in determining the effectiveness of sand mixing. Even distribution of a radioactive clay throughout a milled sand is a simple and reliable index of completion of the milling operation.

Another paper dealing with sand was presented by A. R. Abraham, who described characteristics of plain silica and naturally bonded sands available in Great Britain. The most novel feature revealed by this paper concerned work on the blending of natural sands to produce controlled characteristics. It was demonstrated that blended sands could be produced to show, at, say, a constant 6 per cent moisture content, four distinct permeability ranges—40-50, 50-65, 65-80, 80-95. Each of these four ranges possessed, as blended, the same green compression strength of 4-5 psi, a figure which could be raised to 8-9 psi after 10 minutes of milling.

Another paper dealing specifically with mold making was offered by H. Pinchin and covered the mechanical side of mold production in a large, mechanized foundry. Details were given of the operation of large molding machines and particularly of the practice followed in using sandslingers for production of a wide variety of molds. Numerous examples were given of pattern layouts, corebox details, runner parts, and the precautions needed to insure proper distribution of sand in the mold. Photographs clearly showed the effect of incorrect adjustment of the slinger head.

The American exchange paper also fitted the molding theme. It was by T. E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago, and dealt with pressure or diaphragm molding. The paper emphasized the necessity to use sand of high strength and high flowability, coupled with the use of a diaphragm to apply high-pressure air over the whole of the sand area. It was pointed out that the process has introduced new concepts of size of molds since it generally is possible to make a large mold in the same time as a small one. This fact encourages grouping of small castings in considerable numbers on one large pattern plate.

Mold phenomena also were dealt

with by W. B. Hendry and S. N. Wrightson, National Foundry College, in a paper entitled "Some Expansion Phenomena Associated with the Freezing of Nonferrous Alloys." It dealt with the effect of mold dilation on solidification of nonferrous alloys and formed a parallel to earlier work carried out on cast iron by the British Cast Iron Research Association.

Expansions were recorded on a wide variety of nonferrous alloys and could be reduced by a hard mold. Expansion of the mold, and consequently of the solid skin of metal adjacent to it, tended to lead to unsoundness in the casting. This factor also is associated with the presence of gas. There appeared to be a connection with the presence in copper-base alloys of metals such as zinc, which have low boiling points and thus exert a vapor pressure under casting conditions.

Flow of Foundry Alloys

The French exchange paper by M. Jeancolas concerned the flow of foundry alloys in various types of gating systems with the purpose of showing how far the laws of hydraulics can be applied to the flow of metal in molds. This consideration was based on a review of the available literature and on work carried out in the Centre Technique des Industries de la Fonderie, Paris. Many alloys in various gating systems behaved as if they were water at ordinary temperature. It also was found that the flow distribution in gates often is within 10 per cent of the distribution deduced from the formulas of hydraulics. It is believed that the use of a gating system under pressure gave the best distribution and the best matching between the rate of flow and the gates themselves.

The number of papers of interest only to gray iron founders was unusually low. R. H. T. Dixon, Mond Nickel Co., discussed the purification of gray iron by oxidation through injection of oxygen into or onto the liquid metal. It was found that many elements, such as chromium, lead, and titanium, can be removed with relative ease at rates higher than that of removal of carbon. Simultaneous reductions were effected in silicon and manganese and to some extent in sulfur and phosphorus. The practical implication of these findings lies in the indication that relatively impure raw materials may be used in the production of spheroidal graphite (nodular) iron by first oxidizing away the undesirable trace ele-

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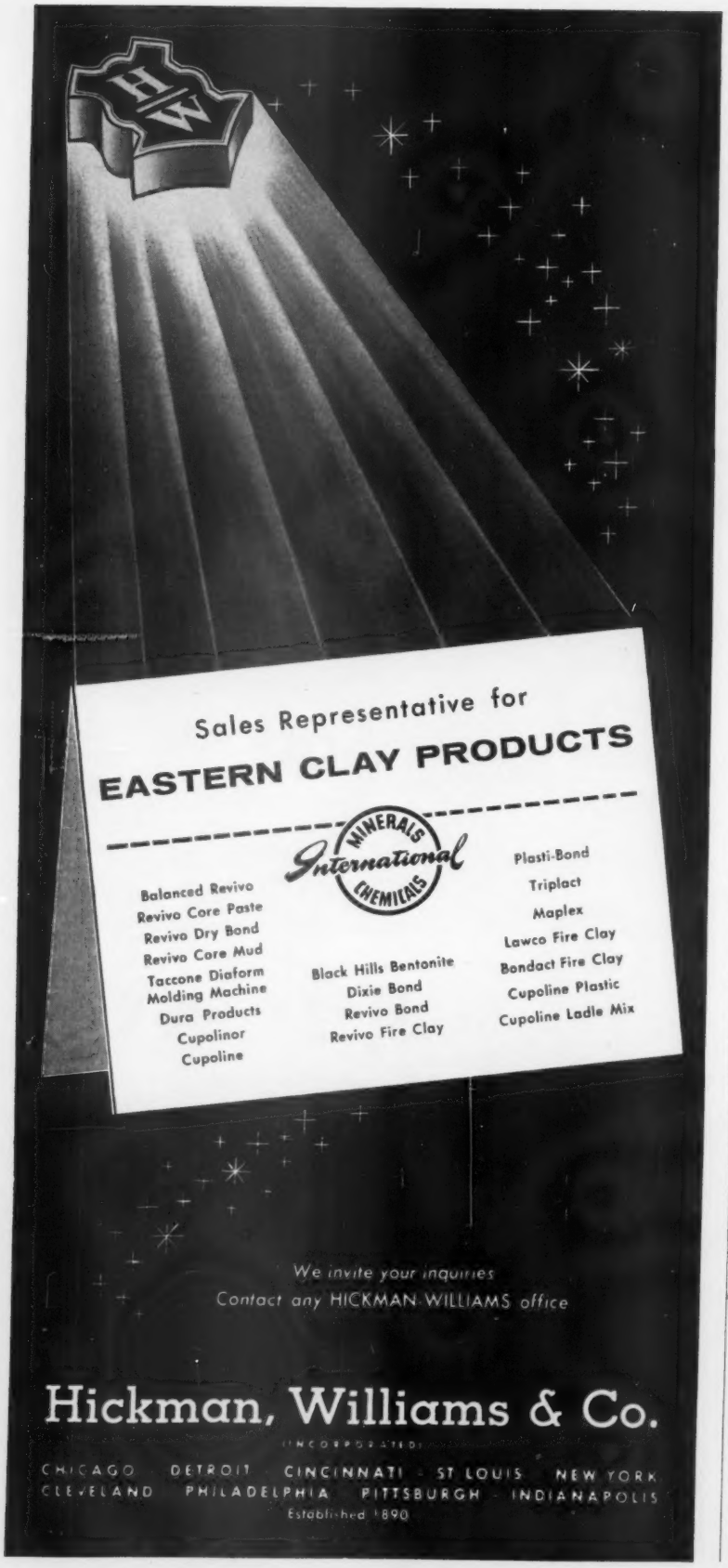

ments, followed possibly by resiliconizing and the normal magnesium treatment.

Malleable iron was covered by a paper by C. T. Moore, British Cast Iron Research Association, dealing with the peeling of whiteheart malleable cast iron. This is a subject on which there has been some disagreement in the past. One set of competent investigators found that a highly reducing atmosphere (high in carbon monoxide) was necessary for the formation of peel, whereas other investigators found that the atmosphere had to be oxidized (high in CO_2. Both occur in the presence of sulfur. The paper provided detailed and convincing evidence on these questions. A high carbon dioxide atmosphere reduced the amount of sulfide penetration by the formation of an oxide eutectic on the surface. Much information was presented on the relationships between the amount of sulfur dioxide in the atmosphere, the nature of the atmosphere, and time and temperature on degree of decarburization and sulfide penetration. It thus was able to explain the discrepancy between the work of the two sets of earlier investigators.

Nonferrous Papers Are Numerous

Papers of primary nonferrous interest were at least as well represented as usual. H. Reiter, British Non-Ferrous Metals Research Association, reported on the influence of sulfur on the properties of sand-cast bronzes and gun metals. This work should relieve the minds of many nonferrous foundrymen, for it was shown conclusively that sulfur contents up to 0.3 per cent did not increase porosity and had no deleterious effect on grain structure, tensile strength, pressure tightness, or any other property examined. It thus appeared that the establishment of very low permissible maximum sulfur contents in certain specifications is unnecessarily severe.

The report of T.S.45, under the chairmanship of A. Logan, gave considerable information on the question of nonferrous melt quality tests. This question was considered for both aluminum and copper-base alloys, in which the problems are not quite the same. In both types of alloy it was found that a high gas content is the greatest single cause of trouble, but that the possibility of determining this condition quickly differs in various instances.

On copper-base alloys, much attention was devoted to the AFS fracture test. It was found that this

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It used to take 40 man hours—

now 8 man hours do the job

Prior to delivery of RB-66 type jets and some military turbojet transports, Douglas makes a thorough check to see that no tools or loose items have been left that might cause structural damage. This means inspection of control surfaces and other areas difficult to "get at"—a job that took 40 man-hours even for the relatively small RB-66's.

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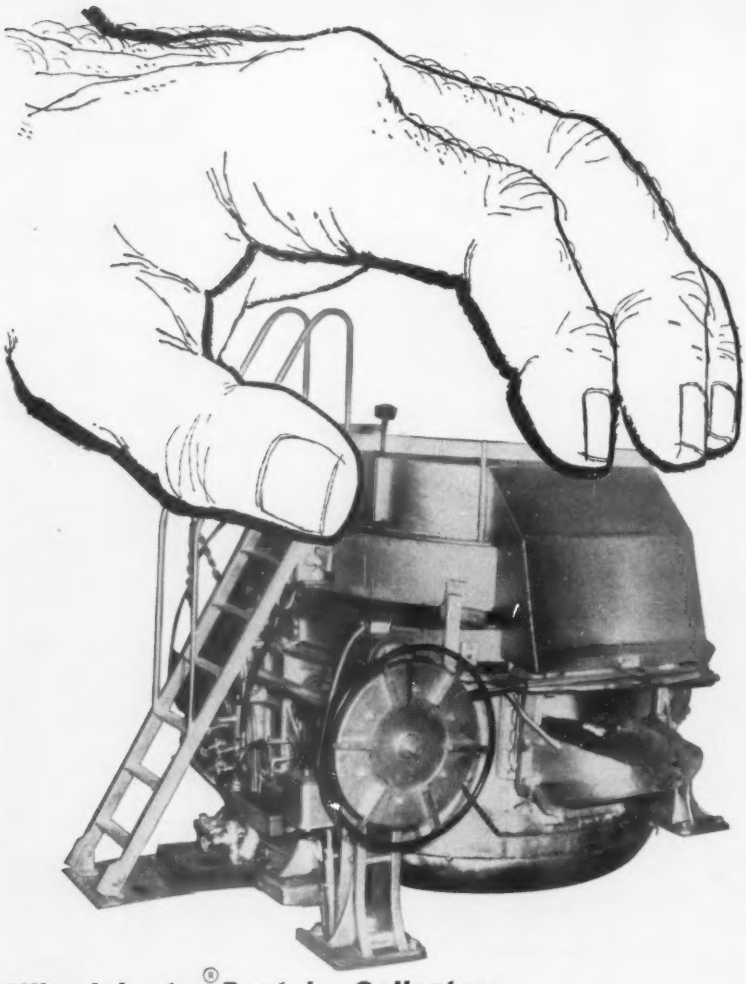

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test differentiates between the best material and the worst material, but that it cannot be used with any consistency or ease for the classification of material of intermediate quality. Rapid density tests are either subject to serious errors in practice or are more suitable for use in the laboratory than in the foundry.

Considerable hopes were entertained for the Lipson, Saia and Rosenthal gravitometer. Much work was done to modify the equipment, but no finally satisfactory result was achieved because of inability to find a foundry method capable of reading the height of a column of liquid to better than 1/50 in.

The Ransley equipment for determining gas content is good but insufficiently robust for the foundry. The reduced pressure tests used in aluminum could not be made to function satisfactorily under the more arduous conditions of copper alloys. In aluminum alloys, however, the reduced pressure solidification test was found to be a well established and satisfactory method of estimating the gas content in about five minutes. Other tests, such as for fluidity and by ultrasonic methods, suffered from serious disadvantages or were insufficiently developed. The information thus is rather negative in character, but does form a most interesting record of a large amount of valuable work.

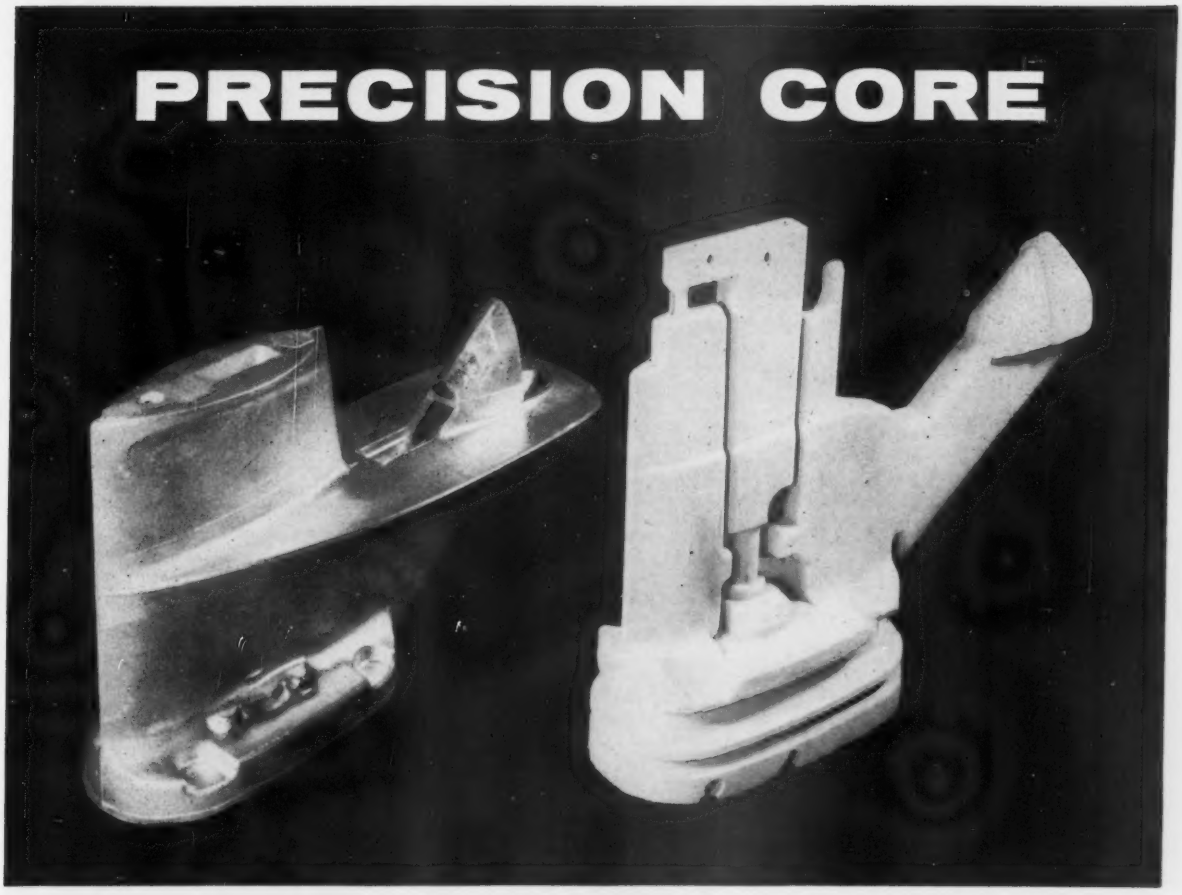
Simulate Shrinkage in Steel

Work on simulating shrinkage defects in steel castings using stearin wax was described by D. B. James and J. M. Middleton, British Steel Castings Research Association. This wax, used under closely controlled temperature conditions, gave a useful but exaggerated indication of the amount of shrinkage in castings of simple shapes. Serious difficulties attended its application to large castings or castings of complicated shape. The paper clearly defines the conditions under which useful information can be obtained.

D. W. Brown surveyed instrumentation for the melting of nonferrous metals. This paper covered instruments for the supply of fuel, control of combustion, and, in more detail, pyrometry. Present tendencies in automatic temperature control were considered, as were such developments as nitrogen degassing.

Of considerable research interest was a paper by D. V. Atterton and D. H. Houseman on the use of an intermediate thermocouple in metal/

PRECISION CORE



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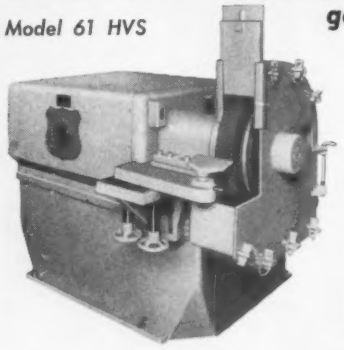

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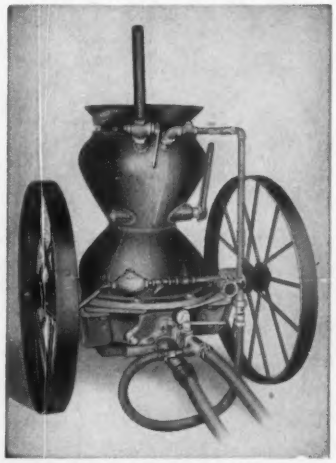
Circle 632 on Page 51

PATCH AND PLACE UP TO 5000 LBS. OF REFRACTORY MATERIAL AN HOUR WITH THE "CEMENT GUN"®



Your own men can learn to operate the "CEMENT GUN" quickly and easily. After that, two or three of them can make all your cupola and ladle repairs in quick time. Using the "CEMENT GUN," they can place a lining 1" to 6" thick in one continuous operation, placing as much as 5000 lbs. of refractory material an hour. Write today for special FREE bulletin describing the "CEMENT GUN," its operation, prices, etc.

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Circle 633 on Page 51

mold interface temperature measurements. This contribution showed that considerably more accurate measurements of the temperature existing at the mold/metal interface can be achieved by using a thermocouple in which the two limbs are not joined, but project along the interface so that contact finally is made only through the molten metal itself. Temperatures recorded in this way were much more in accordance with theoretical expectations than those obtained from conventional, lightly sheathed thermocouples.

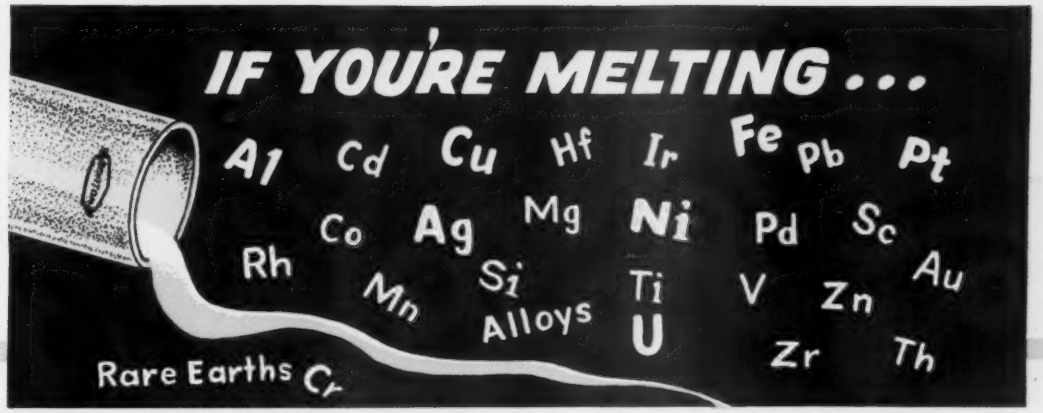
J. I. Blackbourn described the maintenance of plant and equipment, with particular attention to the organization of maintenance. He described a system in use in a large foundry and detailed the various types of forms and the planning involved in such operations.

Describes Steel Foundry

A modern foundry for the manufacture of small steel castings by new molding techniques was described by J. H. Osborn, R. F. Horton and T. A. Marsden, Osborn Precision Castings Ltd. This plant was designed to produce high-accuracy castings in stainless and other alloy steels. A large part of the production is by shell molding, and the layout for equipment was described fully, with consideration to the circumstances under which shell molding can be employed economically. The paper included a short description of the Osborn-Shaw process, which makes use of a wood pattern over which a slurry with a controlled gelling action is poured. The process is especially useful for production of prototypes. Reference also was made to a process in which a mold is built up from core blocks produced by the CO_2 process.

Past President E. Longden, presented a paper on heat exchangers which was intended to stimulate further thought on their design. He described two suggested types, one a rotary type incorporating a series of heat-resistant steel blades attached to a moving shaft, and the other a regenerator type of exchanger involving the storage of heat in a nest of metallic balls.

In addition to the full program of technical sessions, members were able to visit a number of well known foundries in the territory of the East Midlands Branch. There also were evening banquets, of which the high point was the annual banquet, attended by some 500 members. The principal guest was Lord Hives, for many years head of Rolls-Royce Co.



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Furnace Sizes in Pounds	Outside Diameters	Wall Thicknesses	Over-All Heights
½ to 300	1⅛" to 12¼"	⅛" to ⅝"	3½" to 16½"

Materials Available

ALUNDUM*	"A" 99% Alumina	All Sizes Shown	**ZIRCONIA**	"H" Fused Stabilized Zirconia	All Sizes Shown
CRYSTOLON*	"G" First Quality Silicon Carbide	All Sizes Shown	**THORIA**		½ to 50 lbs.
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Furnace Sizes in Pounds	Outside Diameters	Wall Thicknesses	Over-All Heights
½ to 50	1 3/32" to 5 13/16"	3/32" to 5/32"	3½" to 10 11/16"

Materials Available

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Norton crucibles are *engineered and prescribed* for a long list of metal melting operations. Available in a wide range of materials, sizes and types — as shown in the tables — they provide long, trouble-free service, protect your product purity and meet specific melting requirements.

Norton heavy wall crucibles, exceptionally strong and dense, are used for most induction furnace melting jobs. Thin wall crucibles, generally of lower porosity, are particularly suited for special and nuclear metallurgical processes. Their fine, smooth surface is particularly valuable for protecting high purity metals from refractory inclusions.

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How to upgrade your iron without changing furnace practice

Small additions of molybdenum, made right in the ladle, are the most practical way to add strength and toughness to gray cast iron. A good rule of thumb to follow is: 50 points of moly=7000 psi tensile strength.

There's no need to interfere with your regular cupola operation when a job calls for high strength iron. Simple-to-make moly additions in the ladle provide needed strength, without any sacrifice in toughness. In fact, moly increases toughness at least as much as strength.

Moly helps, too, in obtaining uniform response to heat treatment, and in producing machinable, growth-resistant castings.

Remember: Moly additions upgrade your iron—with no change in the character of the charge, normal melting practice, or the base metal. For more information on why moly makes better cast iron, write for the series of bulletins "Why Moly Iron". Climax Molybdenum, Dept. 20, 500 Fifth Avenue, New York 36, N. Y.

MOLY MEANS STRENGTH

0.25% Mo will increase tensile strength by about 3500 to 4000 psi
0.50% Mo will increase tensile strength by about 7000 to 7500 psi
0.75% Mo will increase tensile strength by about 10500 to 11000 psi
1.00% Mo will increase tensile strength by about 14000 to 15000 psi

Section size 1.2 in. dia.

CLIMAX MOLYBDENUM

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Foundry Developments

By EDWIN BREMER
Metallurgical Editor

PROGRAM on high-temperature standard samples is being conducted by the National Bureau of Standards, Washington, at the request of the Navy Bureau of Aeronautics and the Wright Air Development Center. Standards for both spectrometric and chemical analyses are being prepared to cover the composition ranges of 17 commercial types of high temperature alloys. Principal alloying elements are iron, nickel, and cobalt in various proportions with lesser amounts of carbon, manganese, silicon, chromium, molybdenum, tungsten, columbium (niobium), and aluminum. In addition to the major elements, minor or trace elements such as boron or zirconium may have marked effects on their properties. Due to the complexity of the alloys, chemical analyses are difficult and time consuming, but optical and x-ray spectrometric methods offer considerable promise for rapid analysis. To meet that need, spectrometric standards are being prepared first and will be followed by improved chemical methods.

Withstands Heat

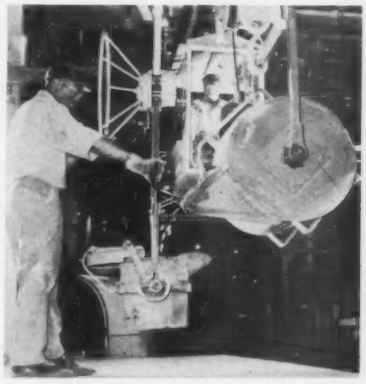
HIGH-TEMPERATURE cast alloy developed by Westinghouse Electric Corp., Blairsville, Pa., is a nickel-base type containing chromium and tungsten as well as minor amounts of five other elements. Termed Nicrotung, the alloy is designed for application as jet engine turbine blades. It is reported that at a temperature of 1700° F the alloy withstands a stress of 32,000 psi for as long as 100 hours. At 1800° F it will withstand a stress of 22,000 psi for 100 hours.

Overcomes Cracking

STRESS-CORROSION cracking in aluminum bronze is claimed to be overcome in a new composition developed by Ampco Metal Inc., Milwaukee. Designated as Grade 8, the alloy contains 0.35 per cent tin in addition to the usual copper-aluminum-iron combination. Applications of the alloy include paper mill drier rolls, brewery percolators, chemical plant heat exchangers, seawater evaporators, and fractionating towers and equipment in the chemical industry.

Marble Players

ACCOMPANYING illustration shows method used to provide metal-pouring crews with skill and knowhow prior to placing the new Indianapolis Ewart foundry of Link-Belt Co. in operation in June. In this method, ordinary glass marbles were placed in the ladles; the slick, fast-rolling spheres simulated closely the action of molten



metal. Result was that the pourers gained the practiced touch necessary to fill the molds properly for production of quality castings.

Consider Magnesium

DATA and conclusions drawn from an exploratory investigation to determine the alloying characteristics of additions of high melting point elements and their influence on microstructures, mechanical properties, and corrosion resistance of magnesium and magnesium-base alloys are presented in a report from Office of Technical Services, Department of Commerce, Washington 25. The report is designated PB 131198, "Magnesium Alloys with High Melting Point Additions," and describes results obtained with additions of titanium, hafnium, tantalum, nickel, cobalt, vanadium, boron, chromium, yttrium, rhenium, columbium, tungsten, and molybdenum. Study was part of a project aimed at developing magnesium-base alloys with high mechanical and physical properties. Price of the report is $5.

Measuring Thickness

SURVEY of the available information on various methods and problems of measuring thickness that frequently are encountered in science and industry is presented in "The Measurement of Thickness," by George Keinath, National Bureau of Standards, and available from the Superintendent of Documents, Government Printing Office, Washington 25, for 50 cents. Methods are treated in seven groups according to physical operating principles such as mechanical, chemical, electrical, magnetic, optical, x-ray, and radioactive radiation. Discussion of ranges, accuracy, advantages and limitations is included.

Fretting Problem

STUDY of "Fretting Corrosion of Cast Iron" by F. T. Barwell and K. H. R. Wright is presented in the April issue of *B.C.I.R.A. Journal of Research and Development* (Birmingham, England). Results show that lubricated cast iron specimens in the as-cast condition exhibit less susceptibility to fretting than annealed specimens. Liquid lubricants appear to be slightly more effective than greases; incorporation of extreme pressure additives in greases and molybdenum disulfide in oil appears to be of no benefit. All cast iron surfaces examined behave less satisfactorily than hardened tool steel specimens. When they are lubricated there appears to be no strong correlation between the individual hardnesses of the cast iron specimens and their susceptibility to fretting. Under dry conditions marked differences are observed in performance of the samples, and there is some correlation between fretting damage and phosphorus content of the irons.

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...that FLEXIBLOS handle any core box ...with any core sand ...at lower cost!

Sure we wanted to do a better job in our core room and save money too, but we wanted actual proof before going ahead with Flexiblos. That's why I went to Chicago for an actual demonstration. I took along some of our toughest core boxes and sent ahead samples of a really difficult sand. Other blowers had failed and I wanted B&P to prove that these boxes could be blown with my sand on a Flexiblo. I'd given up on other machines—even the imported ones—and that's why the results of my trip to Chicago were so gratifying.

PROVED! FLEXIBLOS HANDLE ANY CORE BOX THAT CAN BE BLOWN ON ANY MACHINE

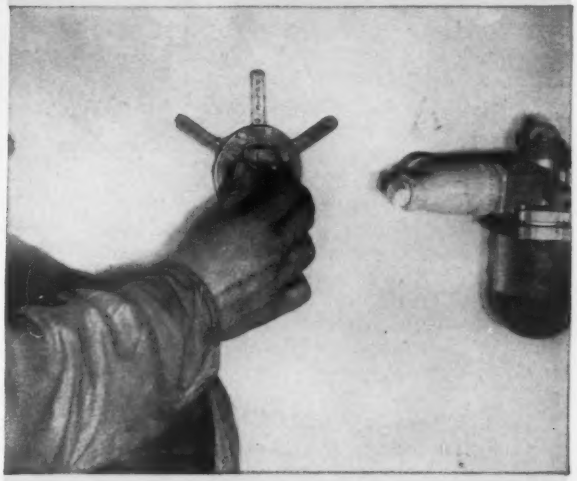
Flexiblos not only successfully handled those boxes that had been blown on other machines, but successfully handled boxes that could not be blown on other machines. Not only that, but Flexiblos handled the boxes using three distinct types of operation on the same machine. They call it three-in-one operation, and it provides for a normal full pressure blow, a regulated pressure prefill followed by a full pressure blow, or a regulated pressure pulse, at a flick of a selector lever.

PROVED! FLEXIBLOS HANDLE ANY CORE SAND THAT CAN BE BLOWN ON ANY MACHINE

The samples of core sand I sent ahead were really tough. I included new high strength sands, as well as the conventional sands that we were using in our core room. They loaded my extra tough sand in the hopper and then had a 200 pound man jump on it and compact it. I knew that no hopper compacting in my own foundry would ever equal that. Yet, the Flexiblo operated effectively and easily.

PROVED! FLEXIBLOS BLOW FASTER AND HARDER

You can bet that I wanted to inspect every core blown on the Flexiblo. I wanted to see if they were hard and uniform. I knew where the soft spots had occurred when these cores were blown on other machines, and I wanted to see if there were soft spots on the Flexiblo cores. I checked a lot of cores and every one was hard and uniform. They had been blown faster than I had ever seen a machine blow cores of their size and shape.

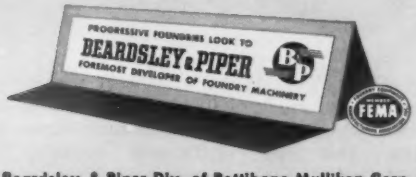


PROVED! FLEXIBLOS BLOW AT LOWER COST

Naturally I was interested in cost, since in our foundry we have to justify every penny we spend. I wanted to know about initial cost, installation cost and operating cost. I had expected a pretty steep price tag on a machine as good as the Flexiblo, but I was surprised. These machines are priced competitively, and when you consider that three-in-one feature, nothing else comes close to them. I studied installation costs, too, and found that the rigid balanced cast frame of the Flexiblo made it easier to install and easier to keep in effective operation after installation. I found that the new diaphragm clamp system produced such a tight seal that blow-bys and core box wear were eliminated.

THAT'S WHY I BOUGHT FLEXIBLO!

*Based on 24 actual operating demonstrations.



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Industry Briefs

COOPER Alloy Corp., Hillside, N. J., is starting a two-year expansion and modernization program. The first phase of the program will cost about $1/2 million and will include additional manufacturing areas, equipment, and new material handling systems for the foundry and other departments, and construction of a 16,000-sq-ft addition to the administration building.

Revere Copper & Brass Inc., New York, has appointed Federated Metals Div., American Smelting & Refining Co., New York, to be a national distributor of its primary aluminum pig and ingot to the foundry industry. Revere aluminum comes from Ormet Corp., a new primary aluminum producer owned jointly by Revere and Olin Mathieson Chemical Corp.

Burndy Corp., Norwalk, Conn., is closing its brass and aluminum foundry in Lynwood, Calif. All work gradually is being shifted to the company's eastern plants.

W. R. Grace Co., New York, and **Eriez S. A.**, Erie, Pa., and Panama City, Panama, have built a million-dollar plant in Sao Paulo, Brazil, for the production of permanent magnet castings. Known as Eriez S. A. Productors Magneticos e Metalurgicos, the plant also is producing Alnico V magnetic separation and automation equipment under license from Eriez Mfg. Co., Erie, Pa.

American Malleable Castings Co., Marion, Ohio, now is operating new facilities for the production of pearlitic malleable iron castings. Addition of these facilities is another phase of a complete plant and equipment modernization program inaugurated after World War II.

Durez Plastics Div., Hooker Chemical Corp., Niagara Falls, N. Y., has been decentralized and will operate as an autonomous division. Hooker Chemical is the former Hooker Electrochemical Co.

Leeds & Northrup Co., Philadelphia, has begun construction of a $1.7 million, 65,000-sq-ft scientific research center at North Wales, Pa., near Philadelphia. It is scheduled for completion next spring.

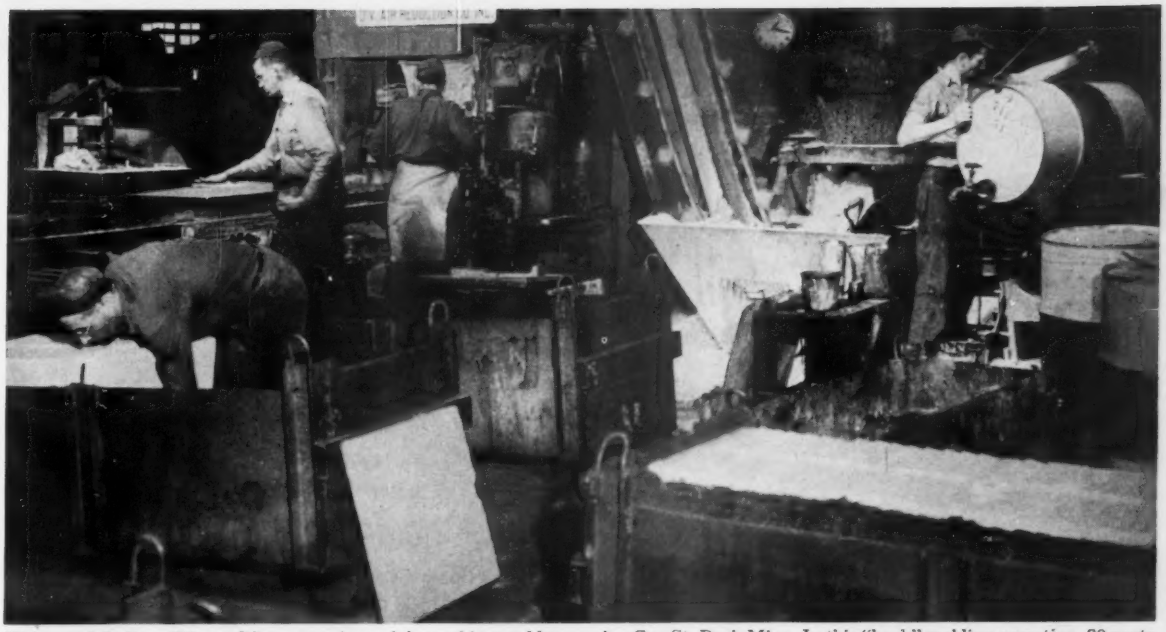
United Engineering & Foundry Co., Pittsburgh, will expand its plant at Vandergrift, Pa., at an estimated cost of $1 3/4 million. The expansion will include extensions to both the casting and steel roll finishing buildings. The casting building extension will provide space for a roll casting pit 32 x 60 ft x 30 ft deep and for roll molding operations and a large roll mold drying oven.

Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has purchased the land and buildings of Prescott Co., Menominee, Mich. The purchase was aimed primarily at acquiring another gray iron foundry facility to supplement its Kaukauna, Wis., gray iron foundry. The rest of the plant will continue to be operated by Prescott, which will remain an independent company, under a lease arrangement with Giddings & Lewis.

Cast Masters Inc., 1331 18th St., Racine, Wis., has been incorporated with 500 shares of common stock at no par value and 250 shares of preferred stock at $100 per share. Registered agent is R. J. Christensen, same address.

Reynolds Metals Co. has moved its sales headquarters from Louisville to Richmond, Va. The move brings together in Richmond all the company's headquarters managerial

AMPCO OPENS TEXAS FOUNDRY: Ampco Metal Inc., Milwaukee, has begun operations at its new $¼ million foundry and Southwest sales center in Garland, Tex. The 15,000-sq-ft facilities include sand and centrifugal casting facilities for production of bronze castings in weights ranging to more than 2000 lb. Among other facilities are testing, inspection, and machining equipment. The Garland plant will employ about 20 persons at the outset and will serve a six-state area in the Southwest. The illustration shows Dallas area visitors watching the pouring of first molds during an open house



High-speed Sodium Silicate-CO_2 process is used for making molds for hangar-door counterweights at St. Paul Foundry and Manufacturing Co., St. Paul, Minn. In this "book" molding operation, 30 parts are made with one pour in clamping jacket (*above right*).

These 4 men make 680 rigid, accurate molds in 6 hours with the

SODIUM SILICATE-CO_2 process

Greatly increased production of grey iron castings at the St. Paul Foundry and Manufacturing Co. is credited to the sodium silicate-CO_2 process. The binder used is Archer-Daniels-Midland's "Adcosil," based on Du Pont Sodium Silicate; CO_2 is the curing agent.

Curing takes so little time that 4 men turn out 680 accurate molds in 6 hours for 20 tons of poured metal! Other processes—like green-sand molding—require up to 12 men, yet still can't match CO_2 output. St. Paul Foundry workers prefer CO_2 molding because there are no objectionable fumes. Management likes the extremely close tolerances of the molds—possible because the sand hardens while in *direct contact with the pattern.*

Perhaps your operation can profit with the sodium silicate-CO_2 process, just as the St. Paul Foundry does. Ask your foundry supplier for full details about this timesaving process, or write to Du Pont for names of suppliers of binders based on Du Pont sodium silicate.

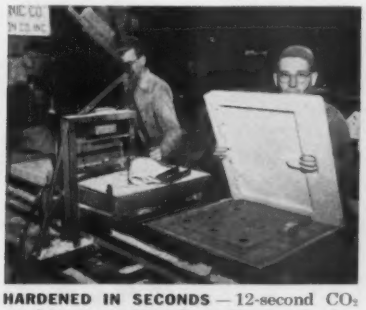
E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Rm. N-2533, Wilmington 98, Delaware.

DU PONT SODIUM SILICATE

REG. U. S. PAT. OFF.

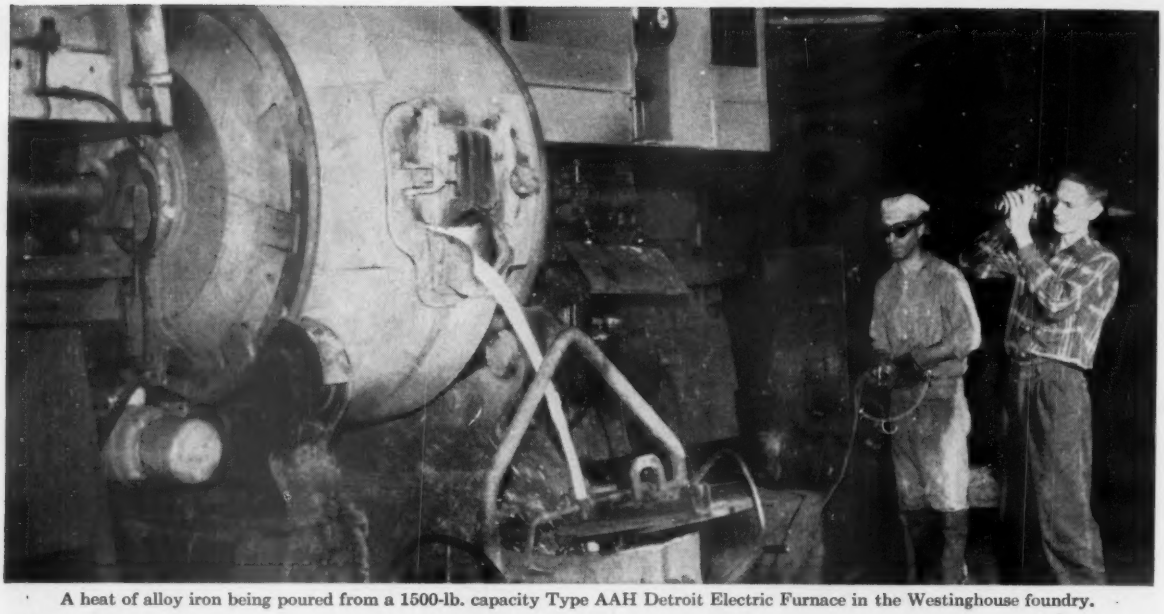
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

CORE BLOWER forces sand into pattern mold, forming an exact duplicate. St. Paul uses mixture of sand and "Adcosil," a binder made by Archer-Daniels-Midland, Cleveland, Ohio.



HARDENED IN SECONDS—12-second CO_2 gassing reacts with sodium silicate to harden mold while still in pattern. Cured mold won't crack when lifted, is rigid enough to stand on edge without damage.

NO COSTLY SET-UP EQUIPMENT—Molds are placed in clamping jacket for metal pouring. Castings cool overnight. Next morning "books" are shaken out, and jackets made ready for next pouring.



A heat of alloy iron being poured from a 1500-lb. capacity Type AAH Detroit Electric Furnace in the Westinghouse foundry.

Nine Detroit ROCKING Electric Furnaces Melt Brass and Ductile Iron for Westinghouse Air Brake Co.

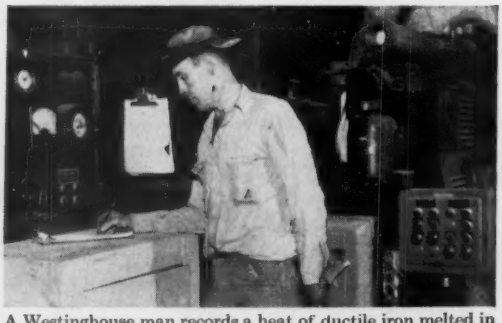
Brass, ductile iron, gray iron and special alloys are melted in the nine Detroit Rocking Electric Furnaces at the Westinghouse Air Brake Division foundry.

Whether your foundry produces one product or a variety of metals and alloys, Detroit Electric Furnaces can provide melts of consistent high quality and do it economically.

Detroit's indirect arc melting and automatic rocking action assure homogeneity and close analysis control through heat after heat. Using quickly interchangeable shells, a single Detroit Furnace can melt different alloys with a minimum of downtime. Simply exchange shells, set the desired melting cycle and the furnace is ready for charging. You get full utilization of furnace capacity plus high quality results.

Send us your operating data and our engineers will show you how Detroit Electric Furnaces can best meet your melting requirements.

A battery of six 750-lb. capacity LFYH Detroit furnaces melt bronze of more than a dozen specifications.



A Westinghouse man records a heat of ductile iron melted in Type AAP Detroit Furnace with motorized electrodes.

DETROIT ELECTRIC FURNACE DIVISION

Kuhlman Electric Company • Bay City, Michigan

Foreign Representatives: In BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N.Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D.F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

functions, but does not affect seven Reynolds aluminum fabricating plants in Louisville.

Carl J. Gross Co. has been formed by Carl J. Gross of Chicago and Allan Nichamin of Detroit. It will maintain offices in both cities. The company will act as metal specialists and consultants and will market all grades of primary and secondary metals, alloys, scrap, and residues for domestic consumption and export.

Spectrochemical Laboratories Inc. has completed a $300,000 expansion program and has moved its operations to a new location at 8350 Frankstown Ave., Pittsburgh 21. The new quarters permit it to expand considerably its facilities for providing commercial spectrographic and analytical services.

A. P. Green Fire Brick Co., Mexico, Mo., has merged with Standard Fire Brick Co., Pueblo, Colo. Standard Fire Brick will operate as the Standard Div. of A. P. Green with John MacFarlane, former president of Standard Fire Brick, serving as general manager. No other changes in members of the Standard staff are contemplated.

Union Spring & Mfg. Co., New Kensington, Pa., suffered a fire in its pattern shop on the night of May 12. Interior of the 2½-story brick building was burned out, but other parts of the plant escaped damage. Cause of the fire is not known.

Metal Treating Institute reports that billings by members during April were $2,542,600, a drop of 28.8 per cent from the 1957 month. Billings for 1958 through April are 27.4 per cent below those for the same period last year.

Steel City Testing Machines Inc., Detroit, has been appointed exclusive U. S. distributor for the Penetrascope portable hardness tester, a diamond pyramid hardness tester manufactured in England.

Marketing Counsellers is the name of a new service organization for manufacturers recently established by Nevin J. Rodes, P. O. Box 49, Louisville, Ohio.

Anderson - Nichols Co., Boston, consulting engineers, has formed a material handling section, which will be situated in the company's Boston offices. Leonard J. Edel has been appointed manager of the new section.

Electric Auto Lite Co., Toledo, Ohio, will close its foundry in Mount Vernon, Ill., and consolidate its foundry operations in Fostoria, Ohio.

Vincent Delport, 1888-1958

VINCENT DELPORT, widely known throughout the foundry industry of Europe and the United States, died June 3 at his home in Surrey, England. He had been European editor of FOUNDRY since 1924. For nearly 30 years he was also manager of Penton Publishing Co. Ltd., London, retiring from that post in 1953 but serving as treasurer.

Mr. Delport resigned this year after 32 years of service as European delegate of the American Foundrymen's Society to the International Committee of Foundry Technical Associations, of which he was a past president and honorary treasurer. Last year the AFS presented him its Service Citation for "distinguished service to the society as its European representative, especially in connection with International Foundry Congresses." He attended the Congresses held in the United States in 1934, 1946, and 1952.

Mr. Delport was a past president of the London branch of the Institute of British Foundrymen and for many years was a member of the institute's Council. His long service to the institute and to the International Committee was recognized by the IBF at its recent 55th annual conference when it awarded him its Meritorious Services Medal.

Gold Medal of the Association Technique de Fonderie, of which he was an honorary member, was awarded to Mr. Delport in 1938. In addition to the foundry association of France, he was also a member of the French Metallurgical Society, the Institute of Metals, and the Iron and Steel Institute.

Vincent Delport was born in London, Oct. 4, 1888, and was educated in France. He was graduated from the Ecole Centrale des Arts et Manufactures, Paris, in metallurgy in 1913. During World War I he served in the artillery with the French Army, and in 1917 came to the United States with the French Military Mission. The following year he joined the information department attached to the French High Commissioner in Washington. After demobilization he was on the staff of the United States Steel Products Co., first in New York and in 1920-21 in Paris. His first connection with the Penton Publishing Co. was in 1922 when he became its French correspondent. Engaging in consulting engineering work in Paris in 1921-24, he went to London in the latter year as manager of Penton Publishing Co. Ltd.

VINCENT DELPORT

GM Foundrymen's Club Will Promote Seniors' Banquet

Edward N. Cole, general manager, Chevrolet Motor Div., General Motors Corp., and a vice-president of GMC, will be the main speaker at the annual senior Foundrymen's Club banquet to be held Tuesday evening, July 29, 1958, at General Motors Institute, Flint, Michigan.

Mr. Cole joined Cadillac Motor Div., GMC, in 1933, after he had attended GM Institute. He became chief design engineer of that division in 1943 and chief engineer in 1946. He was promoted to general manager of Chevrolet July 1, 1956, and was elected a vice president and member of the administration committee July 2, 1956.

The Foundrymen's Club, organized in 1954, is promoting the third annual seniors' banquet and preparing a car and casting display to be held in the gymnasium of GM Institute for the event. Cars of the five GM car divisions and the castings used in those cars will be shown.

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Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"We can't wait for orders to come in. We've got to go after poor, ignorant souls who need castings the worst way, but don't know it"

Conglomerania

The centipede was happy quite
until a toad in fun
Said, "Pray, which leg goes after which?"
That worked her mind to such a pitch,
She lay distracted in a ditch,
Considering how to run.
—*Mrs. Edward Craster* (1871)

"OLD CENTIPEDE LEE," they're beginning to call me. What with the new sputnik, France's hysterics, Lebanon's problems, foreign aid, the educational crisis, perils of the railroads, decline of the dollar, industrial production curves, small cars, and the scrap metal situation, I'm getting to be so befuddled and frustrated that I can hardly make the castings I have to make up in the Lee Hobby Foundry.

Not Responsible — There's one thing about all this confugalty, however, that's just a teeny bit comforting: I didn't have a darned thing to do with most of it, I think. So it gets my mind off myself and the things I should have done that I haven't done—which of course is a relief of no mean voltage. Then, too, the hypothetical mess we're in makes scanning the pronouncements of our profound, statistically fortified economists an exciting adventure in the hope of finding a ray of sunshine or some sign that the tide has turned.

All of which reminded me of a prayer almost everyone has heard or read and attributed to just about everybody and his uncle:

Dear God! Please give us the *courage*
to accept with *serenity*
The things that can't be changed.
Give us the *strength* to change the things
which can and should be changed.
And, Dear God! Please give us the *wisdom*
to tell one from the other.

I don't think there is any question that our supply of information, hunches, guesses, and dice-thrown conjectures is 'way, 'way beyond our digestive capacity. Our intake has constipated our uptake and paralyzed our output. In fact, it's getting to be kind of ridiculous.

After all, the mind of even the most brilliant man can entertain only one sharply focused thought at a time. It can hop and skip from thought to thought, but it cannot straddle even two, let alone the hundreds of thoughts and factors many of us are trying to juggle.

One at a Time—It's just about time we began shrinking the world-wide acreage of our concerns to a small lot with a fence no farther than 10 ft at its widest distance from the old home diggings. This may be selfish in the eyes of those who are trying to be gods, planning world salvation, but, by golly, all of the worthwhile things are done one at a time, with one thought at a time, by one man at a time, working with what he has now, under conditions as they are now, and with the tools he has now.

The world always seems to be in the grip of some calamity

This ravin' and rantin' is sure proof that the weight of years has clamped well down upon me. But in the light of this heavy burden, I can't recall one single period in which some sort of a calamity was not variously hovering over us, descending, or already down, and something tells me that this situation is the norm. Under these conditions, we have come a great distance, and in spite of the gloomy talk, we haven't scratched the surface.

There's More To Come—Regardless of all the "viewing with alarm" curves, statistics, and high-domed pronouncements, one whale of a lot of castings are being poured and a two-whale lot can and should be poured in the future, starting right now. In this two-whale future, we no longer can wait for orders to come in by themselves. Those that are self-propelled are being followed by a pack of hungry wolves.

We've got to go after poor ignorant souls who need castings the worst way, but don't even know it. (Competitors don't even suspect them.) Then, with facts, sweatily mined and riddled, we've got to sell these poor neglected needers on their needs, on their luck in having us show them the light, our ability to satisfy their needs, and their ability to do something about their situation now.

Of course, an awful lot of ore will have to be processed, but when the

atrophied pick-and-shovel sales muscles have got back in shape, we'll get into the swing of getting business, instead of taking it. We'll be so worn out at night that we won't have the strength or the desire to read about current dilemmas, much less to worry about them.

I'm going to turn over a new leaf up there in the Lee Hobby Foundry—mentally, physically, and production-wise.

National Castings Council Elects at Annual Meeting

Gordon E. Seavoy, president, Foundry Equipment Manufacturers' Association, and vice president, Whiting Corp., Harvey, Ill., was elected president of the National Castings Council at the annual meeting which was held in Cleveland, May 12.

Ross L. Gilmore, president, Steel Founders' Society of America, and president and general manager, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., was named vice president.

F. Ray Fleig, representing the Foundry Facings Manufacturers' Association and president, Smith Facing & Supply Co., Cleveland, was re-elected treasurer, and Frank G. Steinebach, vice president, Foundry Educational Foundation, and vice president, Penton Publishing Co., Cleveland, was re-elected to be secretary of the organization.

The council considered numerous industry problems, including developments at Washington as they affect the foundry industry, the possibility of improving exhibits of castings for the general public, and what should be the functions and future scope of the National Castings Council.

G. E. Seavoy

R. L. Gilmore

F. R. Fleig

F. G. Steinebach

American Welding Society Revises Safety Standard

A complete revision of Standard AWS-ASA Z49 offered by the American Welding Society covers the entire field of safety in welding and cutting. Basic precautions for fire prevention and protection are covered in detail. Precautions necessary when using the newer welding processes and eye protection are particularly stressed. Other recommendations deal with ventilation, health protection, and safe handling of fuel gas and oxygen cylinders. Standard may be obtained from American Welding Society, 33 West 39th St., New York 18, at $2.

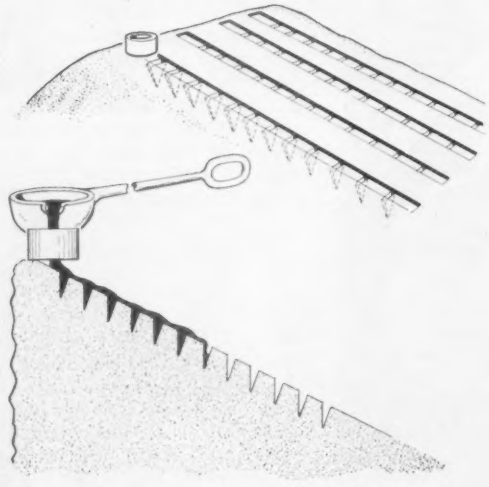
Offers Film on Shell Molding

Availability of a new slide film on shell molding has been announced by Monsanto Chemical Co. Entitled "Shell Molding Techniques," the film is a 35-mm color presentation with sound. Running time is about 20 minutes. Step-by-step techniques of the process are shown. Dump-box mixing and sand coating, as well as production of dumped and blown shells and cores, are described. Members of the foundry industry may borrow prints of the film without charge from Department SM, Monsanto Chemical Co., Springfield, Mass.

HOW TO DO IT

Cast Iron Wedges Can Be Made Quickly in this Simple Mold

By LEONARD H. AKERMAN
Foundry Foreman
Kent Alloys Co.
Rochester, Kent, England



CAST IRON WEDGES are used by many foundries. A quick way of making them is shown in the accompanying drawing. Green sand is rammed with a shovel handle into a bank having a slope of about 30 degrees. Several runner channels are made by pressing a pipe or stick into the sloping face of the sand bank. Then a wedge pattern is stuck into the sand at intervals along the runners. Metal poured at the top of each runner will run down, filling the wedge cavities.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

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Hoeganaes Ancor Sponge Iron is a metallic product reduced from iron ore at such low temperature that melting of the iron or the gangue constituents has not taken place. *They have exceedingly uniform analysis from shipment to shipment.*

This is of importance too . . . the following elements are non-existent or only present in trace amounts . . . Nickel, Molybdenum, Cobalt, Zinc, Hydrogen, Nitrogen, Chromium and Tin. Ancor Sponge Iron has a very high degree of reduction–96%. It performs at least as well as a low-carbon, high-grade ingot iron.

If you're interested in *regularity of your melting operation* and *greater uniformity of your steel analysis*, be sure to write for the fact-filled literature. Better still, ask for a Hoeganaes Engineering Specialist to call and give all the facts first hand. He's at your service.

Write for literature containing basic facts, typical analysis and working data . . . ask for Form No. 113

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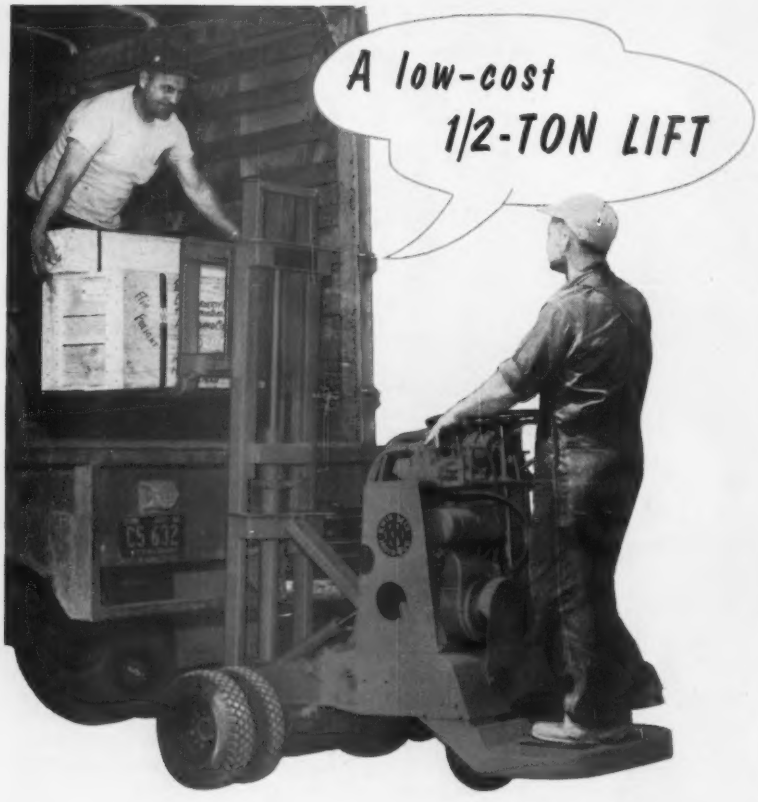
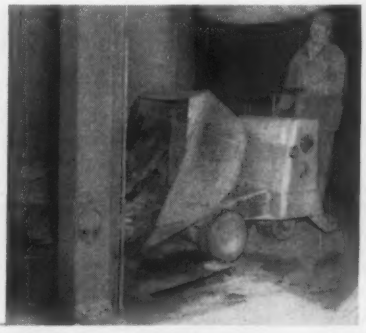


Low-cost Moto-Bug puts fork lift service within economical reach of small foundries — and has unlimited usefulness as an auxiliary lifting tool in large shops. It handles a lot of light-load work where the cost of operating big, expensive lift trucks is prohibitive. Kwik-Mix S-10 Moto-Bug lifts 1000 pounds (at 15-in. load center) to 6-foot height. Forks are 20 or 30 inches long, adjustable 6 to 32 inches wide. Tilting mast optional. There's full power forward and reverse — safe, automatic "deadman" brakes. Turning radius is only 61 inches — overall width 39 inches.

3-Way usefulness — You can add an interchangeable hopper body, or flatbed platform for hauling loads up to 1500 pounds. This gives extra earnings on your original investment — provides 3-tool usefulness for all kinds of material-handling. Larger-capacity R-18 Moto-Bug with multiple attachments is also available at low cost. See your Kwik-Mix distributor soon — or send for Moto-Bug catalog today.



mail to:

KWIK-MIX COMPANY, Port Washington, Wisconsin

Send literature on S-10 Moto-Bug with: ☐ fork lift ☐ hopper ☐ platform

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☐ Also interested in larger multiple-tool R-18 Moto-Bug KM775 FO

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How To Reduce Noise in Foundry Cleaning Rooms

Dampen the Vibrations of Equipment and Castings

By William L. Lea, Ph.D.*

NOISE abatement measures and the problem of excessive noise have been of interest to many types of industry in Wisconsin in recent years because a partial loss of hearing, acquired over a period of years, now is compensable.

Noise really is nothing more than minute air pressure variations occurring at a rate of from 20 to about 10,000 cycles per second. A solid, liquid, or gaseous body vibrating in this frequency range acts on the air in contact with one or more of its surfaces and produces air pressure variations at the rate of vibrations. Striking a key on the piano, for instance, causes the string to vibrate at a certain frequency, or number of vibrations per second, and produces pressure variations in the air of the same frequency.

These air pressure variations radiate outward from the vibrating surface and act on the ear, producing the sensation of sound. Excessive air pressure variations or loud sounds acting on the ear for a prolonged period of time — perhaps years—can damage the ear and reduce its ability to hear sounds. This damage constitutes a partial loss of hearing.

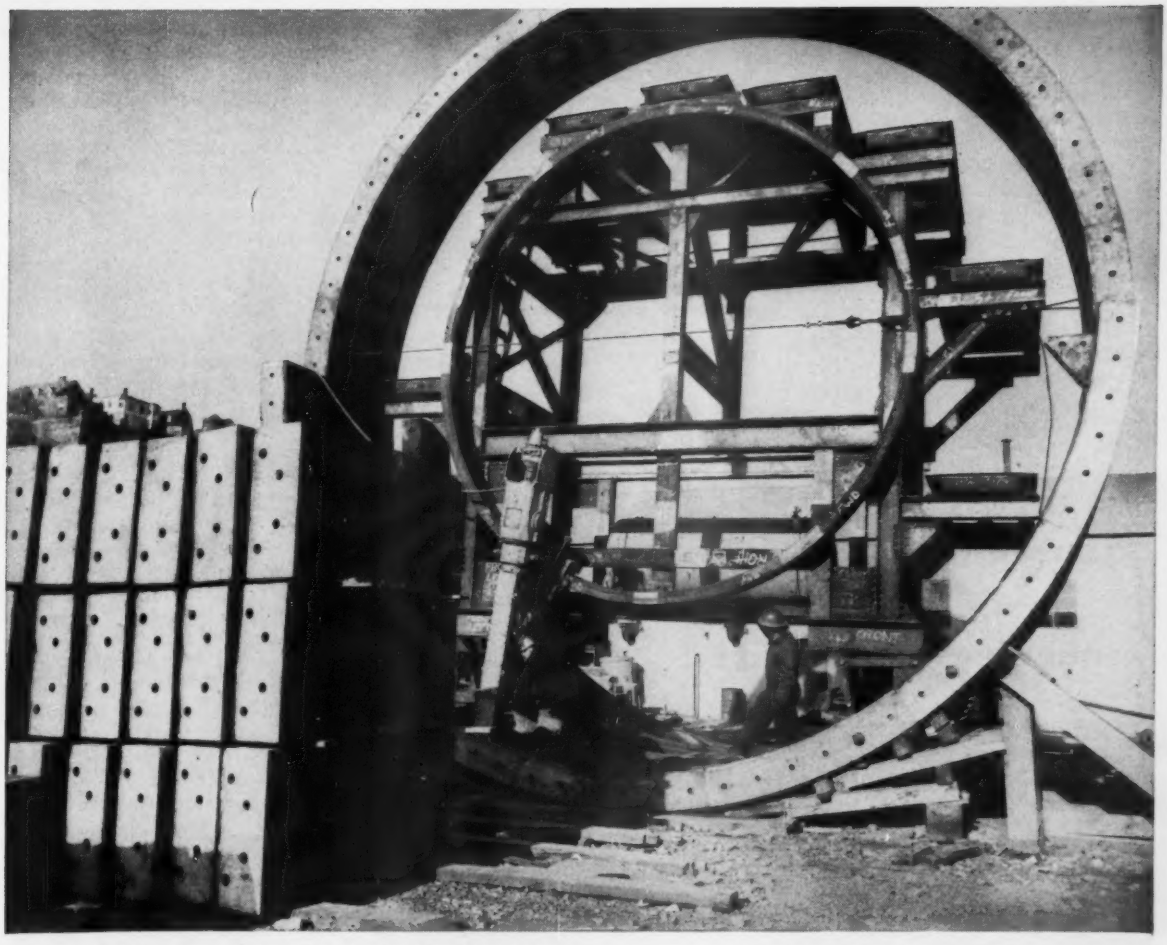
Measured in Decibels—The loudness of sounds or noises is measured in units called "decibels." Unfortunately, these units have a logarithmic relationship rather than the arithmetic relationship we are accustomed to dealing with.

In a comparison of the power of two sounds, a difference of three decibels indicates that one sound has twice the power of the other. For example, a noise measured at 97 decibels has one-half the power of a noise measuring 100 decibels. A noise measured at 94 decibels has one-half the power of a noise measured at 97 decibels and only one-quarter the power of a noise measuring 100 decibels.

Noise is a mixture of many sounds of widely differing frequencies of vibration.

Measure the Frequency — When noise studies are made in the found-

*Director, Industrial Hygiene Div., Wisconsin State Board of Health, Madison, Wis. This article is condensed from a paper presented at the Wisconsin Regional Foundry Conference, Feb. 14.



CASTINGS TO KEEP TRAFFIC MOVING SMOOTHLY—Giant castings, such as these used in highway tunnels, are another example of how the foundry industry contributes to progress.

TRULINE® BINDER ENDS FOUNDRY TRAFFIC JAMS

Foundries can't afford traffic jams. That's where Truline comes in—helping to keep castings moving on schedule and preventing oven bottlenecks.

In the core room, in the oven, in the cleaning room, Truline Binder avoids delays every step of the way. For example, Truline's quick bake often makes it possible for one oven to do the work of two. Cores bonded with Truline collapse readily; are easily removed by hydroblast or knockout.

To learn more about how Truline can help keep your foundry on schedule, write for full information.

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Circle 642 on Page 51

ry, it is imperative that a frequency analysis of the noise be made concurrently with the measurement of total noise power. A frequency analysis is necessary because the ear is more sensitive to and more easily damaged by some frequencies than others.

As a rule, the noise problem in a foundry is the greatest in the casting cleaning area. Operations such as grinding, tumbling, chipping, blast cleaning, and loading tote boxes produce vibrations of equipment and castings and, therefore, produce noise. To reduce the loudness of the noise, it is necessary to reduce or dampen the vibrations of equipment and castings.

A marked reduction of the noise intensity in a casting cleaning room can be accomplished only by dampening the vibrations of all noise sources and, if necessary, by providing acoustical baffles overhead near the ceiling.

The noise from tumbling mills may be reduced by these steps: 1. Mounting the mills on vibration-isolation mountings. 2. Providing a vertical, counter-weighted, sliding door in front of the tumblers. This door should be of 2-in. lumber. 3. Coating the outside of the mills with a ¼-in. layer of car undercoating material. 4. As an alternative to using car undercoating, by lining mills with commercially available rubber liners.

Coating Useful—The noise from blast cleaning operations may be reduced by coating the outside of the hopper with a ¼-in. layer of car undercoating material or lining the inside of the hopper with two 1-in. layers of wood and covering the inside layer with sheet metal.

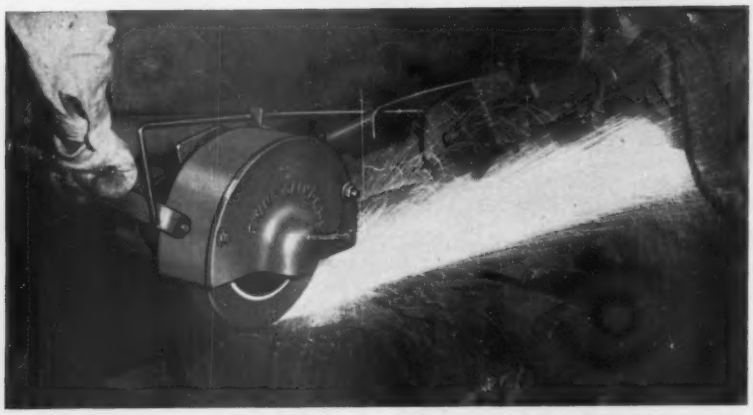
To reduce noise from stand grinders, mount the wheels on the shaft with vibration isolation material or mount the work rest standard in vibration-isolation material.

Noise caused during loading of metal tote boxes with castings may be reduced by coating the outside of each tote box with ¼ in. of car undercoating material or covering the bottom of the tote box with a layer of sand or shot 1 in. deep.

By applying these simple and relatively inexpensive noise reduction measures to the principal noise sources in casting cleaning, a marked reduction in total noise will result. A further reduction in casting cleaning room noise can be obtained if desired by use of overhead, hanging baffles of acoustical material. The baffle installation should be made on the advice of and under the direction of an experienced noise control engineer.

ATLANTIC WHEELS

spark new savings on snagging operations!



Take the toughest snagging operation you can find, add fast-cutting, cool-running Atlantic Grinding Wheels, and watch your grinding costs flatten out to a money-saving minimum. Made with a special resinoid bond to withstand high centrifugal forces, these work-proved wheels have a smooth, floating action that speeds up grinding . . . gives you cleaner surfaces with fewer passes.

Start saving now, by giving Atlantic Grinding Wheels a trial run in your plant. An Atlantic representative will gladly recommend the right wheel for your particular operation without obligation. Write for details and a copy of the **Atlantic Grinding Wheel Catalog.** Atlantic Abrasive Corporation, 534 Pearl Street, South Braintree 85, Massachusetts.

Atlantic Abrasive Corp.

A DIVISION OF ABRASIVE PRODUCTS, INC.

South Braintree 85, Massachusetts

STRAIGHT WHEELS • CYLINDER WHEELS • CUP WHEELS
CONES • PLUGS • MOUNTED WHEELS AND POINTS

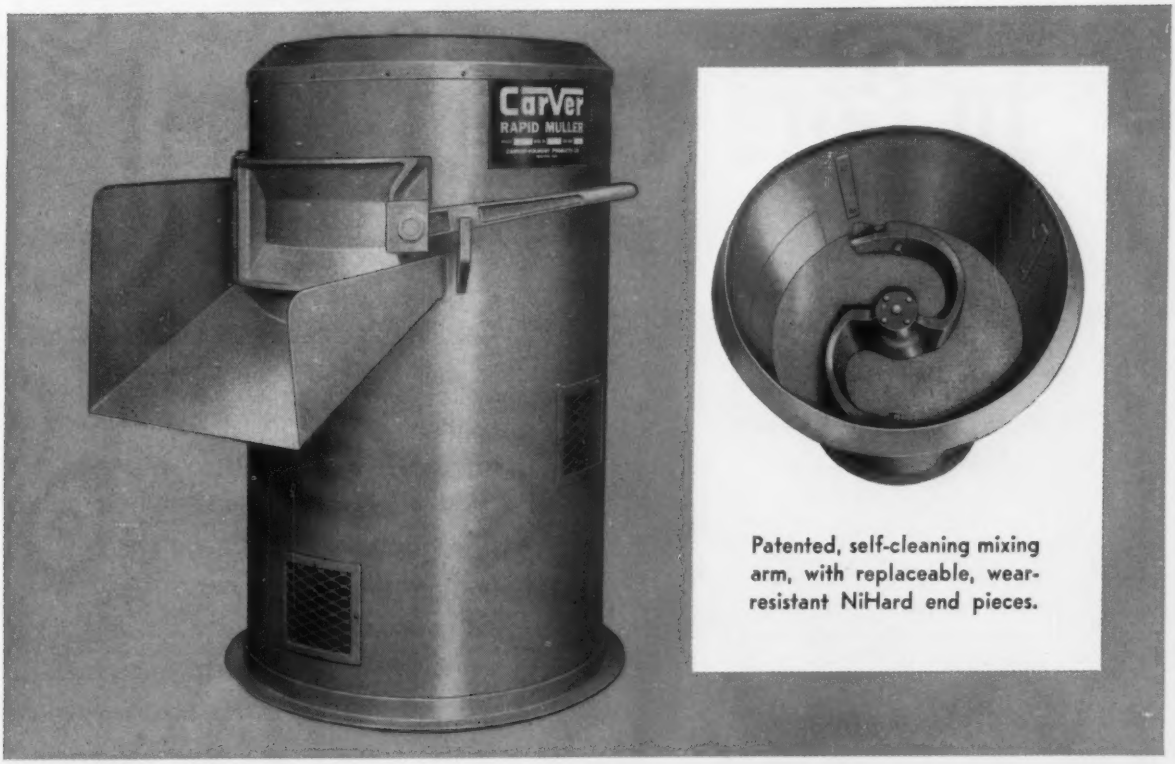
New Scrap Processing Plant In Iowa Covers 42 Acres

Construction of one of the nation's newest and most modern scrap processing plants has been completed at Davenport, Iowa, by Alter Co. and Alloy Metal Products Inc. The combined facilities cover 42 acres of plant site.

Alter's iron and steel scrap processing plant covers more than 20 acres of production area and includes nearly 5 miles of railroad track within the plant. An outstanding feature of the facility is a scrap baling press capable of compressing 350 tons of scrap, ready for open-hearth charging, in 8 hrs.

The secondary nickel plant of Alloy Metal Products Inc. occupies production facilities embracing more than 200,000 sq ft of building space and 22 acres of land. The firm is said to be the largest producer in the world of secondary nickel alloys.

NEW CARVER RAPID MULLER



Patented, self-cleaning mixing arm, with replaceable, wear-resistant NiHard end pieces.

FAST! A BATCH EVERY 76 SECONDS!

Not only does this revolutionary new machine mix core sand *fast* . . . the mulling action is so thorough that you *save up to 30% in binder!* Each grain of sand receives an equal coating of binder, so that the finished mix is absolutely free from lumps or wet spots!

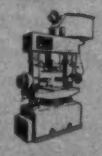
No more cleaning or maintenance problems! The new Carver Rapid Muller mixing arm does most of the cleaning itself. And it's easy to reach inside and clean, without awkward wheels and paddles to get in the way. Maintenance? There is only *one* moving part . . . *eliminating wear and costly repairs.* You can *rely* on the Carver Rapid Muller because of its *extreme simplicity* in design. Takes up only 7 square feet of floor space — *the most compact muller on the market!*

Most important, your initial investment in the Carver Rapid Muller is *two or three times lower* than most other makes!

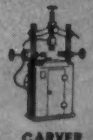
COMPARE CARVER WITH ANY OTHER MULLER -- RIGHT IN YOUR OWN FOUNDRY! Carver will place its Rapid Muller alongside *any* other muller and let its performance speak for itself. *You be the judge* — and let the best muller win!

WRITE OR CALL TODAY FOR COMPLETE DETAILS

Only CARVER Has Everything For the CO_2 Process!



CARVER V & S Core Shooters



CARVER Automatic Gassing Apparatus

KRAUSS Core Vents

STEINEX available only from **CARVER**

MAIL TODAY

CARVER FOUNDRY PRODUCTS CO.,
Muscatine, Iowa

RUSH information on new Carver RAPID MULLER and FREE DEMONSTRATION!

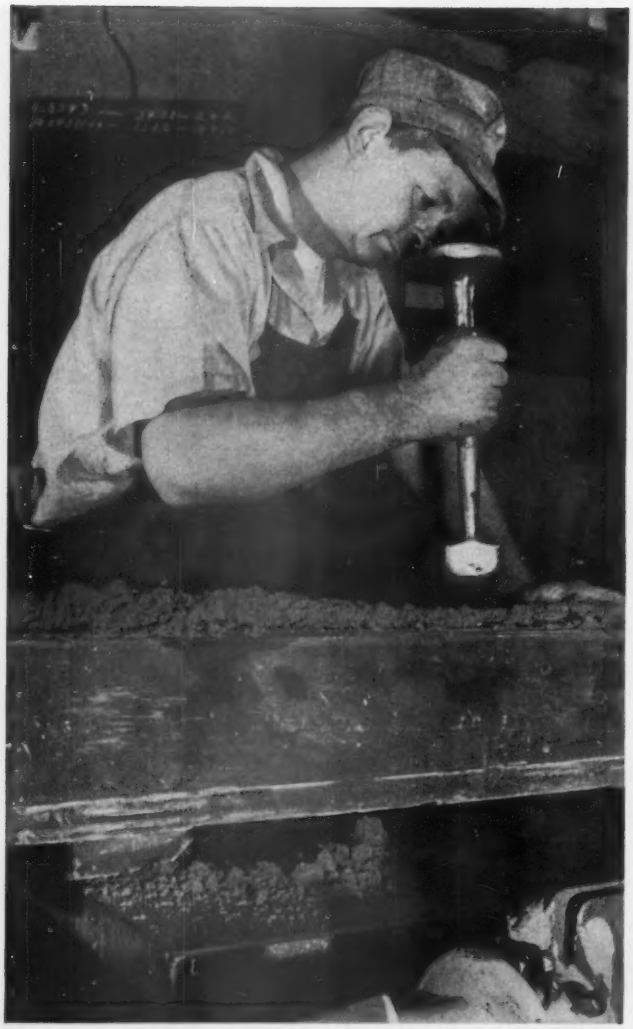
NAME _____ TITLE _____

FOUNDRY _____

CITY _____ STATE _____

Circle 644 on Page 51

Save Up To 50% In Core Baking Time!



Dexocor yields top results with all ramming processes.

Use Dexocor binder, the amazing new binder for sand molds. Field reports show this *dry* replacement for core oil cuts baking time 30 to 50 percent!*

Savings of fuel dollars and more flexible production scheduling are only two of Dexocor's advantages. Among its other features are: faster mulling... low gas generation... excellent green strength ...high baked strength...uniform density ...easy shake-out...ready collapsibility.

Whether you make small or large castings, simple or intricate, you will profit by the properties of Dexocor. One foundry now uses it in 19 different sand and core mixes!

For the full facts on this amazing new binder and technical assistance in adapting it to your special needs, contact our nearest sales office or write direct.

*Source on request

DEXOCOR® binder

DEXOCOR® is the perfect teammate for MOGUL® and KORDEK® binders and GLOBE® dextrines

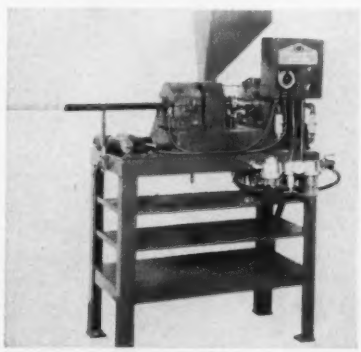
CORN PRODUCTS SALES COMPANY · 17 Battery Place, New York 4, New York

FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 193

STOCK CORE EXTRUDER

Continuous extruder automatically produces hollow or solid pin cores, sprue liners, or rod molds from resin-coated sand fed into electrically-heated dies. Rated production is



up to 6 fpm. Sizes with different dies range from ¼ to 2 in. ID or OD in ⅛-in. increments. Electrically - controlled, pneumatically-driven ram operates in hardened steel, interchangeable dies. Water-cooled hopper loading section requires ½-in. water line and drain, air connection is ½-in. line at 100 psi, and electric current requirement is 230 v, 4 kw, 60 c, single phase.—**C & S Products Co.**, 18656 Fitzpatrick Ave., Detroit 28, Mich.

For More Details Circle No. 401—Page 193

DIECASTING MACHINE

Machine, rated at 1000 tons, is designed to produce aluminum diecastings weighing up to 25 lb. Its features include heavy, one-piece base; automatic lubrication; manifold hydraulics; leak-proof piping; 40 hp motor; two large-capacity hydraulic pumps; 230-gal hydraulic reservoir; filter capacity four times pump capacity, and automatic timing remote control panel. Machine specifications include: Locking pressure, 1000 tons; size of die plates, 67 x 67 in.; die thickness, 45 in. max, 24 in. min; die opening, 20 to 30 in., and space between tie bars, 42 x 42 in. The machine also can be supplied for casting zinc.—**Cleveland Automatic Machine Co.**, 4932 Beech St., Cincinnati 12, Ohio.

For More Details Circle No. 402—Page 193

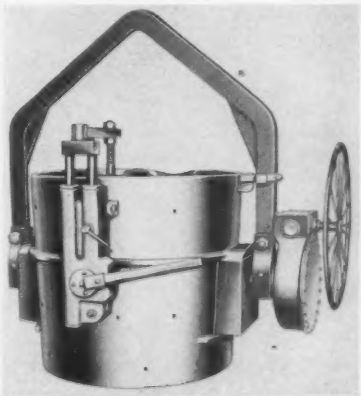
STEEL MESH GLOVES

Protective gloves have a soft, comfortable, cotton flannel base. Four-ply stainless steel mesh is sewn to the glove, providing easy flexing with maximum protection against sharp or abrasive objects, according to the manufacturer. They may be worn as produced or used as a liner glove under any other type work glove. The gloves are available in gauntlet style with full coverage or breathing backs with palm and finger coverage only.—**Surety Rubber Co.**, Carrollton, Ohio.

For More Details Circle No. 403—Page 193

BOTTOM-DISCHARGE LADLES

Bottom-discharge crane ladles for pouring large quantities of slag-free metal feature a geared discharge mechanism engineered to minimize

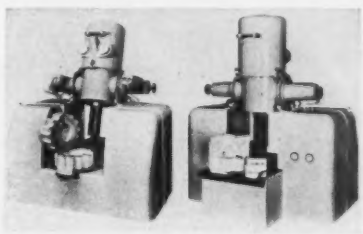


ladle space requirements and promote foundry safety and convenience. Eighteen lever positions are provided for adjusting the operating lever to proper height for safe, easy pouring. Lift column can be clamped securely at any height. The gear unit, oil tight and dust proof, operates in a continuous oil bath. Gear housing cover is gasketed and bolted to the rear of the unit for trouble-free maintenance. The end of the cross arm accommodating the stopper rod is slotted to allow liberal adjustment. Ladles are available in four models, and in capacities of 10,000 to 40,000 lb.—**Industrial Equipment Co.**, Minster, Ohio.

For More Details Circle No. 404—Page 193

VACUUM MELTING FURNACE

Production vacuum melting furnace is designed to make castings



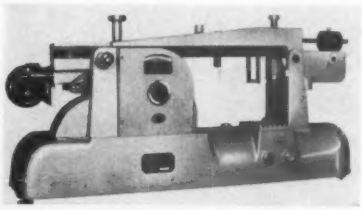
weighing up to 15 lb. The furnace uses a long life, quick change Zirconal composite crucible, said to provide slag-free melts. In operation, the furnace crucible is charged with vacuum melted shot. When melting begins, the mold is clamped over the pouring spout. Then the bell jar is attached to the furnace lid, and the vacuum pump started. When metal is at pouring temperature, the complete furnace is inverted. After the casting has solidified past the critical range, the bell jar is removed and the mold un-

clamped. Furnace is recharged and the cycle repeated.—**British Machines & Foundry Supplies Ltd.**, division of **British Industries Corp.**, 80 Shore Rd., Port Washington, N. Y.

For More Details Circle No. 405—Page 193

UNIVERSAL SAND TESTER

Machine is designed to handle testing requirements for all new



mold and core materials in foundry use. It has reserve capacity to measure properties developed by materials that may appear in the future, it is claimed. The universal sand strength machine conforms to American Foundrymen's Society standards and offers a high degree of sensitivity, range, and versatility. Quickly changed accessories are available for measuring green and dry compressive, tensile, and shear strengths as well as to measure and record deformation or deflection values of various molding, core, and shell sands.—**Harry W. Dietert Co.**, 9330 Roselawn Ave., Detroit 4, Mich.

For More Details Circle No. 406—Page 193

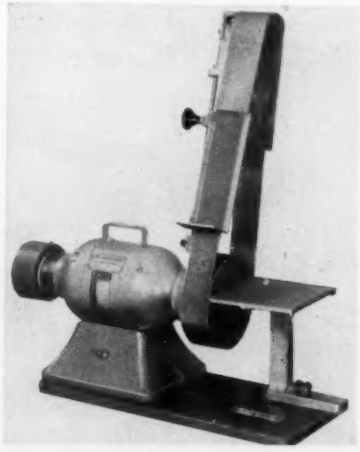
VACUUM GAGES

Accurate measurements of high vacuum on production systems are said to be possible with four models of vacuum gages. A gage is held or placed in a horizontal position and connected to the vacuum system with rubber or plastic tubing. The gage is turned to vertical position, which brings the mercury into a visible capillary. Height of the mercury in that tube indicates the system pressure on a scale. Gage model 276-50 covers a range from 10 microns to 50 mm; model 276-AA from 1 micron to 5 mm; model 276-BB from 0.1 micron to 500 microns, and model 276-AC from 0.01 micron to 5mm.—**F. J. Stokes Corp.**, 5500 Tabor Rd.,

For More Details Circle No. 407—Page 193

GRINDING MACHINE

All-purpose, bench machine for grinding, finishing, and deburring incorporates an abrasive belt and a serrated contact wheel. A coated abrasive disc, fastened to the side of the contact wheel, and a tilting,



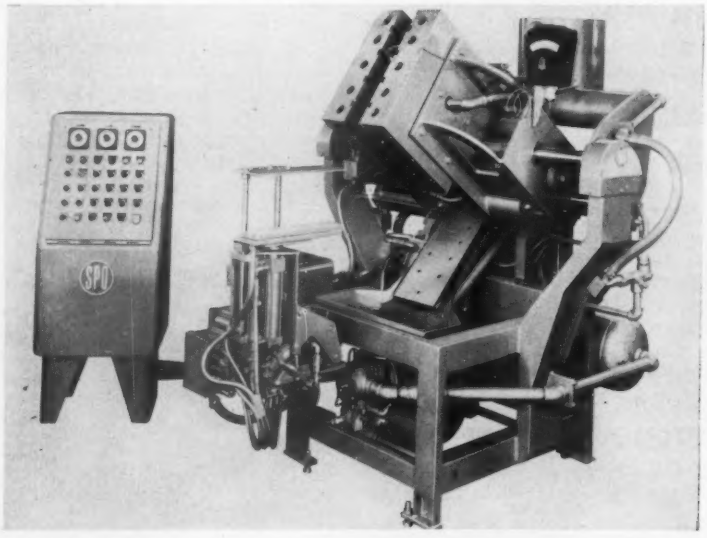
adjustable table permit square and angle grinding as well as chamfering and surfacing. Abrasive belt extension arms can be mounted on both ends of the motor for roughing and finishing with one handling of the material. Flat surfacing applications are done on the platen mounted on the extension arm. Belt operations are accomplished with the extension arm in horizontal or vertical position. Inside diameter or radius sanding is done by using a coated abrasive sleeve on an expanding rubber drum. Grinding wheels, wire brushes, or buffing wheels can be mounted on either end of the motor.—**Curtis Machine Div., Carborundum Co.**, Jamestown, N. Y.

For More Details Circle No. 408—Page 193

TEMPERATURE CONTROLLERS

Controllers contain a percentage timer employing a thermostatic switch governed by a control knob to open and close magnetic switch

Automatic Machine Blows Shell Molds, Cores



Single-station, fully-automatic or manually-controlled machine blows shell molds or hollow or solid cores with resin-coated sand. The machine accommodates corebox es from 3 to 9 in. thick, 1 to 16 in. deep, and 5 to 21 in. high. Several individual coreboxes of identical thickness can be mounted on the gas-fired heating platens at the same time, it is claimed. Up to 30 lb of solid core can be blown. The box is blown at a 45-degree angle and then rotates through an 80-degree arc to drain off any uncured sand.

The sand system is continuous and automatic, requiring no operator attention. Uncured sand is screened prior to draining back into sand magazine. An optional automatic unloader removes cores and deposits them on a conveyor. Other optional features include electrically-heated ovens, thermostatic oven heat control, and automatic corebox spray, as well as mandrel, mandrel stripping, stripping plate, and horizontal parting attachment.—**SPO Inc.**, 7500 Grand Division Ave., Cleveland 25, Ohio.

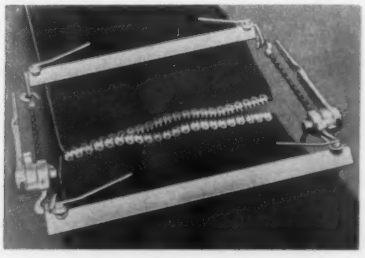
For More Details Circle No. 430—Page 193

contacts carrying load current to a heating device. Stepless and wasteless control of power from 5 to 100 per cent time "on" is provided to maintain any desired temperature within the capacity of the heating equipment. Type 500 units have a wide-scale pyrometer calibrated to 2000° F and 1000° C. Type 500-1 units have a decorative insert in place of the pyrometer; they can be converted for temperature indication by replacing the insert with a pyrometer.—**Thermo Electric Mfg. Co.**, 465 Huff St., Dubuque, Iowa.

For More Details Circle No. 409—Page 193

BELT CLAMP

Heavy-duty clamp is designed for long, high-tension installations of conveyor belts 30 to 36 in. wide. The all-steel clamp consists of two pairs of clamping bars, one pair for each belt end. Each pair of bars includes a V-bar, gripping rod, and draw-up bolt with welded-on handle. In use, the V-bar is placed



on top of belt a short distance from the end. Gripping rod, grooved to hold belt securely, is positioned on underside of belt directly below the V-bar. Draw-up bolts are inserted in threaded holes at ends of gripping rod and V-bar and tightened until belt is held securely. Standard "come along" or "pull-up" tools are used to draw belt ends together. These are not included with the clamp.—**Flexible Steel Lacing Co.**, 4607 Lexington St., Chicago 44, Ill.

For More Details Circle No. 410—Page 193

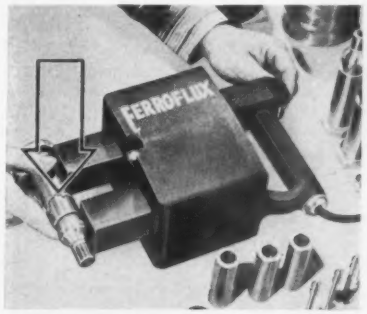
PLATFORM TRUCKS

Line of operator-led, low-lift, platform trucks has lifting capacities from 8000 to 15,000 lb. Powered by Class "H" motors, the trucks have standard battery compartments, but short compartments are available. Steel wheels are standard but rubber wheels are offered in tandem or in line on the same axis. Trucks have 9 or 11-in. lowered heights with a lift of 3½ in. Higher lifts may be ordered. Standard platforms are 27 in. wide and from 36 to 144 in. long. Wider platforms are available.—**Automatic Transportation Co.**, division of **Yale & Towne Mfg. Co.**, 149 West 87th St., Chicago 20, Ill.

For More Details Circle No. 411—Page 193

MAGNETIC INSPECTION

Portable magnetic inspection device is designed to detect surface and subsurface defects in ferro-magnetic material. Weighing 23 lb, the unit



consists essentially of a U-shaped electromagnet which operates at 0.175 kva on 110 v. It clings to the surface it is checking, freeing the operator to handle the detection fluid. When the device is operating and attached to the work, the space immediately surrounding the pole assembly is painted with a solution holding minute particles of iron in suspension. These iron particles concentrate at a surface or subsurface break in the magnetic field. Defects such as cracks, laps, discontinuities, voids, slag inclusions, seams, grinding checks, and hard spots are disclosed. Effective area of inspection is about 4 in. around the contacts and between them.—**Ferro Machine & Tool Corp.**, 5514 W. Washington St., Indianapolis, Ind.

For More Details Circle No. 412—Page 193

PROTECTIVE LEGGINGS

Line of industrial protective leggings has a spring tension instep chain said to adapt itself to any size shoe without manual adjustment. It also is designed to position the flare on top of the shoe where it will give maximum protection. The chain instep is used on conventional knee-length, 12 in. high, leggings and can be adapted to spats and hip leggings.—**Wheeler Protective Apparel Inc.**, 224 W. Huron St., Chicago 10, Ill.

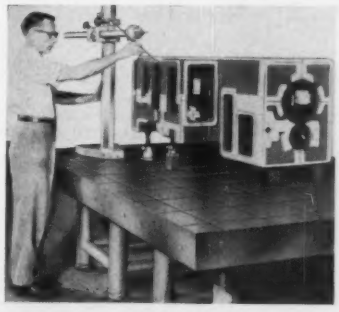
For More Details Circle No. 413—Page 193

SPONGE IRON

Sponge iron offered in the form of briquets weighing about 3 lb is used as a raw material for quality steel production primarily in acid open hearths, induction furnaces, and basic electric arc furnaces. It is a metallic product reduced from iron ore at such a low temperature that melting of the iron or the gangue constituents has not taken place. The product is a virgin, soft iron of high purity, free from tramp elements and dissolved gases, it is claimed. Nickel, molybdenum, cobalt, zinc, hydrogen, nitrogen, chromium, copper, and tin are said

Machine Does Layout Work from Five Sides

Machine lays out and scribes vertical and horizontal lines on castings or other workpieces up to 36 in. horizontally and 48 in. vertically with only one setting of the casting. Measuring unit for the machine permits scribing inside or outside lines for hole center location, finish allowance, and casting clean-up. Vertical and horizontal scales are marked off in inches with separate adjustable verniers reading to 1/64 in. A lock is provided on the crossarm and column. The vertical scriber rotates 360 degrees and swings horizontally 180 degrees. The 30-in.-high table is gray iron, 50 x 70 in., machined flat and smooth. Guide slots begin 5 in. from edge of table and are spaced 10 in. thereafter. This



provides an accurate guide for machine travel in two directions at 90 degrees. Leveling screws and hold-down bolts are built into the table.—**Portage Double Quick Inc.**, 1073 Sweitzer Ave., Akron 11, Ohio.

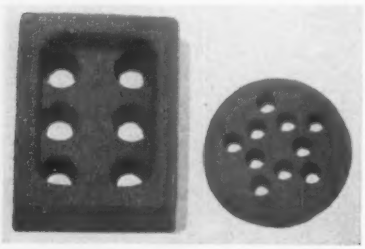
For More Details Circle No. 431—Page 193

to be nonexistent or present in only trace amounts. Sponge iron is of uniform analysis from shipment to shipment, according to the manufacturer.—**Hoeganaes Sponge Iron Corp.**, Riverton 1, N. J.

For More Details Circle No. 414—Page 193

STRAINER CORES

Strainer cores made of refined silica sand and a heat-resistant binder are said to be hard, have



smooth finish and uniform dimensions. Made on specially designed machinery, they are said to be easy to handle. Over 50 standard shapes and sizes are offered, and special rectangular, square, or irregular designs may be obtained at no tooling charge for quantities above a small minimum order. — **Rudow Mfg. Co., Box** 2121, Sandusky, Ohio.

For More Details Circle No. 415—Page 193

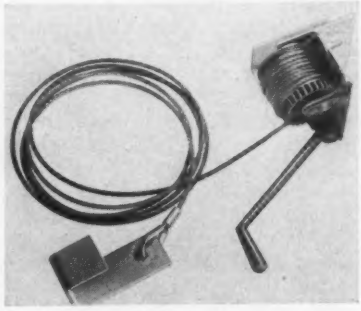
RESIN BINDER

New resin binder is offered for production of cores and molds. When a chemically reactive gas is forced through a preformed sand-resin aggregate the resin is cured by chemical reaction in 1 to 5 seconds. The gas-setting process also is adapted to shell mold production by blowing the sand-resin aggregate between a contoured blower head and pattern; the shell then is cured by gassing while in contact with the pattern. Hollow shell cores also can be made by using mandrels attached to the blow head, if the core blower has a long enough draw. The resin, known as Admirez GS-300, contains no solvent and is said to have excellent storage life.—**Federal Foundry Supply Div., Archer-Daniels-Midland Co.**, 2191 W. 110th St., Cleveland 2, Ohio.

For More Details Circle No. 416—Page 193

SAFETY CABLE

Safety cable for workmen unloading dump cars or hopper is designed to prevent injury or death resulting from suddenly moving loads. The device consists of a small hand winch with a 1/4-in., 6 x 37 wire



rope and universal anchor clamp fittings. The terminal clamp is placed over one end of the car and the wire rope unreeled to reach the opposite end. There the winch is anchored by a second clamp. The worker then attaches his safety belt to the cable and enters the car to begin loosening the load. As load level is lowered, the cable is slacked off to give the workman access to the load. — **Lowery Brothers Inc.**, Dept. FYC, 9332 South Anthony Ave., Chicago 17, Ill.

For More Details Circle No. 417—Page 193

HOPPER FEEDER

Air-operated, high-suction hopper feeder transfers wet or dry fluid materials between bulk bins or shipping containers and processing machinery or storage hoppers. A cover unit may be applied on existing hoppers or process equipment if they are air tight, sturdy, and capable of withstanding a vacuum. If existing equipment is not suitable to direct discharge application, standard receiving hoppers of 2 to 25 cu ft are available. Larger hoppers are designed to specification. Hoppers have a discharge valve that closes automatically when material is being drawn into hopper. Valve is adjustable for controlling discharge rate.—**Vac-U-Max**, One Montgomery St., Belleville 9, N. J.

For More Details Circle No. 418—Page 193

CONVEYOR TURNTABLE

Turnable is designed for universal application. By varying the number of casters used to support the section, capacities can be 1500, 2500,

or 3000 lb. From a minimum height of 6 1/8 in. without roller conveyor section, supports can be provided for correct operating height. The positive stop can be foot-pedal operated as illustrated or hand-controlled as desired. The unit is provided with a dust ring for foundry application. — **Standard Conveyor Co.**, North St. Paul 9, Minn.

For More Details Circle No. 419—Page 193

TEMPERATURE MEASUREMENT

Instrument is designed to measure the temperature of any solid, liquid, or luminous flame in the

All-Purpose Casting Resin Used for Patterns

All-purpose epoxy casting resin is formulated to produce cast sections ranging from 1/16 to 12 in. thick. It is said to cure quickly

and uniformly regardless of thickness, and the hardness can be varied from Shore D-85 down to 22. Linear shrinkage is below 0.001 in. per in. It is a black, filled epoxy resin, and when mixed with hardener L-932B produces rigid castings. Hardener L-943 produces controlled hardness castings. The hardeners may be stored in sealed containers for about 12 months at room temperature. The material is said to be easy to mix and pour. In the illustration the pencil pointer indicates a globe gate valve duplicate split pattern produced in the laminated epoxy resin mold in center from the origial wood pattern at left. The duplicate plastic pattern is said to have good resistance to impact and abrasion.—**Rezolin Inc.**, 1651 Eighteenth St., Santa Monica, Calif.

For More Details Circle No. 432—Page 193

These refractory shapes

stay strong up to 3000°F —are not wet by aluminum

REFRAX® silicon-nitride-bonded silicon carbide refractory looks like a metal, can be formed into shapes formerly possible *only* with metals—yet gives results far superior to most metals. Non-wetting by molten aluminum, for example, prolongs refractory life because dross can't penetrate or adhere. And processes like die casting and aluminizing, which used to operate intermittently because some parts corroded, can now be run continuously.

Iron nozzles for handling molten aluminum are an example. The aluminum causes them to cut out in an hour, or even less. But REFRAX nozzles in the same application often last for as long as *several hundred* hours.

REFRAX parts are not affected by most acids, even corrosive slags and highly-reactive materials. They're also highly resistant to abrasion and heat shock—and retain virtually all of their properties up to, and occasionally beyond, 3000°F.

If you work with aluminum holding or alloying furnaces, (including reverberatory and induction), or could use these properties for other applications, it will pay you to write for complete information from: Refractories Division, The Carborundum Company, Perth Amboy, New Jersey. Please address: Department **C-78.**

CARBORUNDUM

Registered Trade Mark

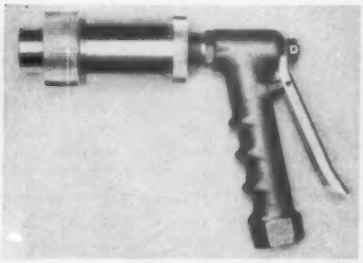
Circle 646 on Page 51

1500 to 4000° F range without need for making emissivity corrections. Accuracy is said to be within 20° F. The instrument consists of a sensing head for detecting radiation and a control unit which interprets the information. Temperature is indicated on a 7-in. meter calibrated in degrees. A 0-100 mv output is provided for operating a strip chart recorder or controller. The instrument may be used for measuring temperature of flowing molten metals or of moving objects in a furnace rather than the furnace temperature. Readings may be translated automatically to control processing in steel melting, annealing, heat treating, and similar applications.—**Shaw Instrument Corp.**, 49 Verona Rd., Pittsburgh 21, Pa.

For More Details Circle No. 420—Page 193

BLAST-CLEANING GUN

Percussion blast cleaning gun employs unbalanced pressure interrupter valves which accelerate the velocity of compressed air. The valves open and close about 65 times per second. The intermittent air blasts have a high velocity and give greater kinetic energy to abrasive grains than a steady flow of



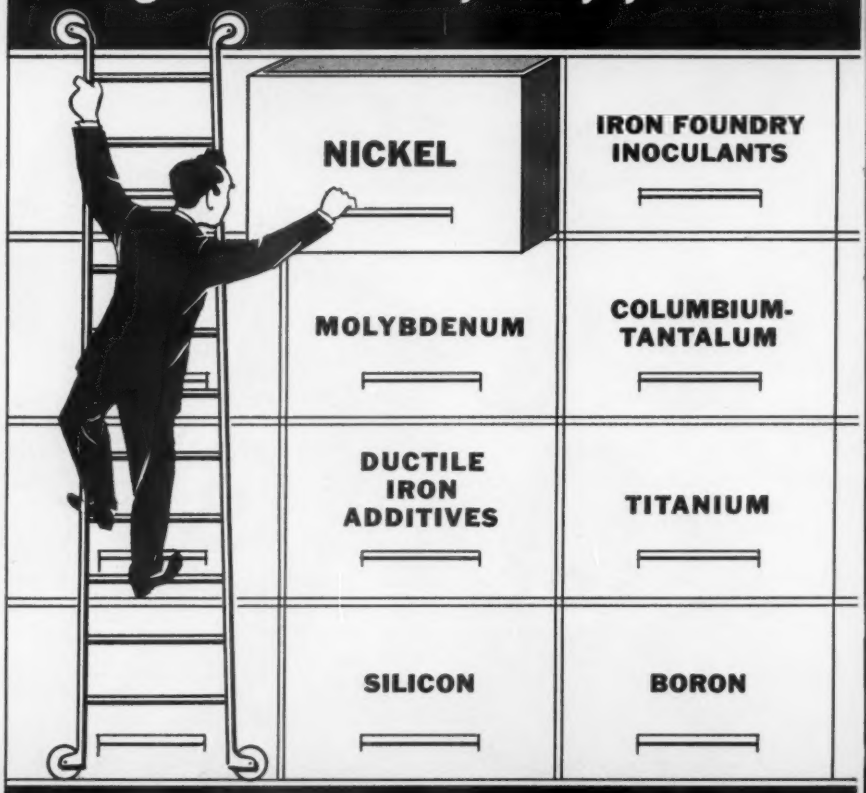
compressed air. This is claimed to give abrasive grains 20 times greater striking force—air at 80 psi produces a force equal to 1600 psi. The tool uses air, air and steam, or air and chemicals with or without No. 1 sandblast sand or finer mesh abrasive. Air pressure may range from 60 to 150 psi, air consumption from 20 to 250 cfm.—**L. C. Nesham Co.**, Box 641, Allentown, Pa.

For More Details Circle No. 421—Page 193

DUST COLLECTOR

Mechanical centrifugal dust collector of modular design is said to provide good inlet distribution and foolproof seal against leakage. Each tube can be rated within a range of 255 cfm at 2 in. water gage pressure drop to 350 cfm at 4 in. water gage pressure drop, both measured at 300° F. Tests show no significant drop in efficiency be-

You get the foundry alloy you need



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These foundry alloys are all the quality products of such leaders in industry as The International Nickel Co., Vanadium Corporation of America, and Shieldalloy Corporation.

So, why not check your supply of foundry alloys? If your stocks are low, get what you need, off-the-shelf, from Whitehead.

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SILICO-MANGANESE	TUNGSTEN	ZIRCONIUM
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CHROMIUM	MOLYBDENUM-CHROME	CHROMIUM-TUNGSTEN

"Supermarket"

Plus Items for Foundries:

Welding Rod – Whitehead Metal "Supermarkets" maintain full stocks of a wide range of welding and brazing supplies. Two of the most popular items are Ni-Rod and Ni-Rod "55" Electrodes which many foundries use in salvaging castings with defects, for repairing heavy sections and joining dissimilar metals. Check your Whitehead man for detailed information.

Aluminum Core Plate – Strong, light-weight, easy to use. Good long-lasting flat core plate available "off-the-shelf" from Whitehead.

Fasteners, too – Screws, bolts, washers, etc., in the quality alloys.

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Circle 647 on Page 51

tween 75 and 125 per cent of design capacity. Inlet flights and tube outlet sections are cast iron. The tubes are heavy-walled seamless steel. Standard construction is good for maximum of 700° F. Units for corrosive or high-temperature applications also are available.—**Buffalo Forge Co.**, Buffalo, N. Y.

For More Details Circle No. 422—Page 193

SHELL CORE-MOLD BLOWER

Machine is cycled automatically. Operator presses foot pedal to start cycle; door carrying half of mold or box closes, lock pins engage, ram

cylinder closes corebox, sand hopper raises, trunnion rotates to invert corebox and blowhead, blow valve invests box. After preset investment cycle, machine returns to initial position, rocks to empty core, hopper lowers. When cure cycle is completed, ram cylinder retracts, door opens carrying the core. Automatic sand feeding from overhead hopper, gas firing, and shutter to prevent peel-back into sand hopper are optional. Carriage slides on four, lubricated, chrome-plated tie bars protected by Teflon scraper rings. Tie bar construction permits mounting of auxiliary equipment at any angle for withdrawal of loose pieces on intricate cores. Corebox temperatures are controlled by individual thermostats on each heater plate. The control panel includes both manual and automatic control. —**Shalco Corp.**, 81 Encina Ave., Palo Alto, Calif.

For More Details Circle No. 423—Page 193

COMPRESSORS

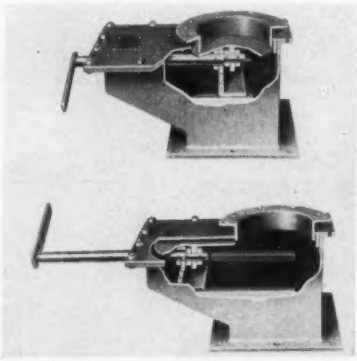
Line of positive-displacement rotary compressors for air, gas, or vapor have capacities of 800 to 13,000 cfm. The compressors are a

two-impeller, helical-lobe type, axial-flow, rotary machine with four-lobe power impeller and a secondary impeller with six matching gaps synchronized by timing gears. Impellers rotate with a pure rolling motion and power is transmitted to the secondary impeller through the cushion of compressed gas. There is no metal-to-metal contact between impellers or with the surrounding casing, making lubrication unnecessary. The compressors can be driven by induction or synchronous motor, diesel or natural gas engine, or steam or gas turbine. —**Fairbanks, Morse & Co.**, 600 S. Michigan Ave., Chicago 5, Ill.

For More Details Circle No. 424—Page 193

HOPPER SHUT-OFF VALVE

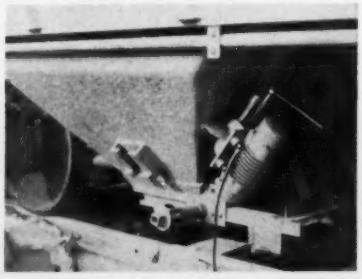
Slide gate, shut-off valve for use in dry dust collector hoppers, storage bins, and transport lines has a gate-actuating mechanism said to offer advantages of a positive gas-tight, dust-tight seal, nonsticking operation, one-handle opening and closing, and placement of gate mechanism out of the path of discharging material. The gate is designed to control all dry, free-flowing materials and is available with round or square inlet.—**Ducon Co.**, 147 East Second St., Mineola, N. Y.



For More Details Circle No. 425—Page 193

ELECTRIC VIBRATOR

Electric vibrator is designed to speed unloading of sand and other types of powdered or granular materials from railroad hopper cars or other transporting equipment. The unit uses a rotary eccentric to set up concentrated vibration when attached to the unloading chute of a car. The vibrator is available with rigid or swinging base and with 1/6, 1/3, or 1 hp motor.—**Engineered Equipment Inc.**, Waterloo, Iowa.

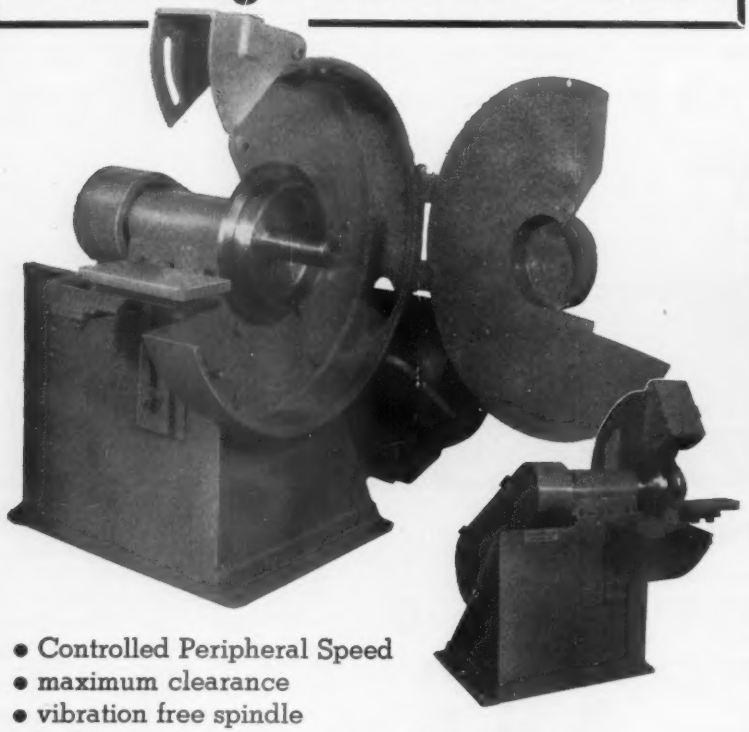


For More Details Circle No. 426—Page 193

POWDER LANCE

Powder lance is said to be capable of cutting through concrete or metal of any thickness. The forward end of the tool has a quick-release chuck-type pipe holder into which lengths of standard black iron pipe are fitted and connected to an oxygen supply and source of special metallic powder. The oxygen and powder are mixed in the pipe and carried to the material being pierced or cut by the consumable pipe. The mixture is ignited at the end of the pipe, producing a high temperature that melts ferrous or nonfer-

In tough grinding nothing beats a FOX



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- maximum clearance
- vibration free spindle
- low maintenance cost • safety for operator.

FOX #1-24

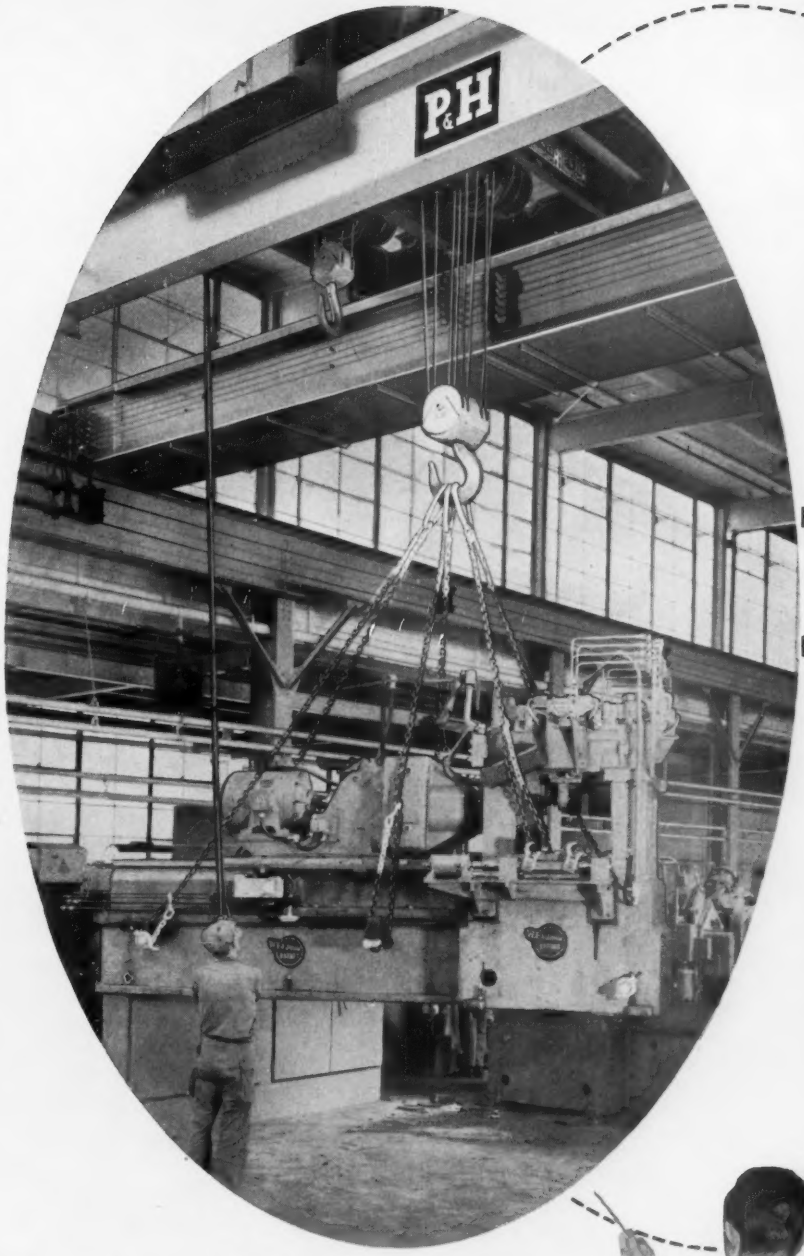
10-15-20 horsepower: Grinding wheel 24 x 3 x 12".

FOX #1-30

15-20-25 horsepower: Grinding wheel 30 x 3 x 12".

FOX GRINDERS, Inc.

OLIVER BUILDING PITTSBURGH 22, PA.



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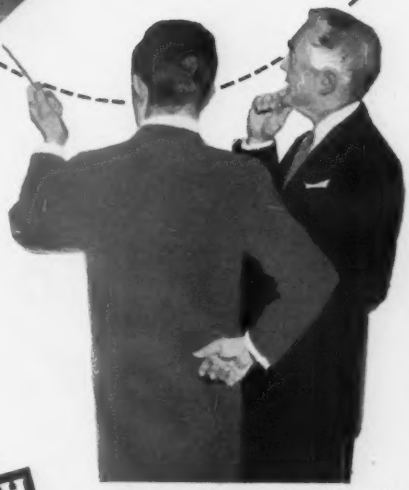
Compare first — then specify! Dept. 123N, Harnischfeger Corp., Milwaukee 46, Wisconsin.



You can buy the Trav-Lift crane — packed with big-crane features — for far less money than you think!

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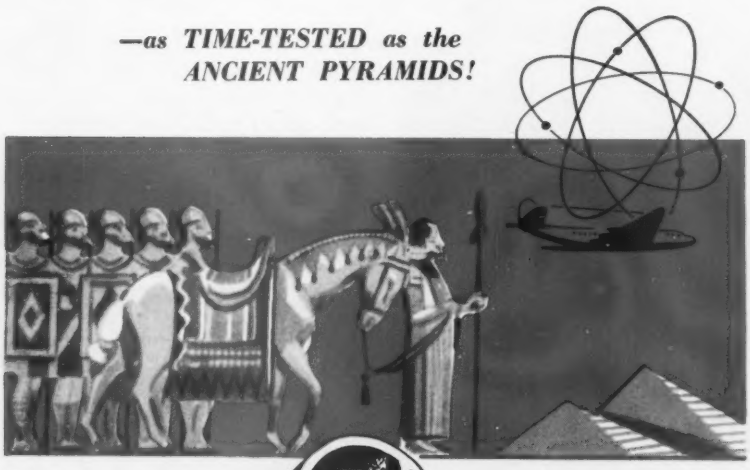
Circle 649 on Page 51

NEW *as the* ATOM

—as TIME-TESTED as the ANCIENT PYRAMIDS!



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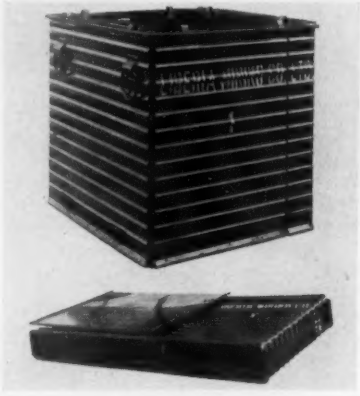
rous metals. Oxygen and powder valves operate independently allowing operator to shut the powder off at any time during lancing. This gives him a clear view of the reaction zone. The tool can be used for opening slag pockets, cleaning soaking pits, de-skulling ladles, furnace tapping, and salamander removal. — **Linde Co.**, division of **Union Carbide Corp.**, 30 East 42nd St., New York 17, N. Y.

For More Details Circle No. 427—Page 193

COLLAPSIBLE BOXES

Collapsible, reusable steel transporter boxes are designed to fold into one-fifth original size after unloading. Boxes come in sizes when open of about 48 to 60 in. square.



They can be supplied with heavy-duty locking arrangements. Welded brackets which hold steel rings positioned for easy pickup by overhead crane hooks are provided.—**Republic Steel Corp., Berger Div.**, 1038 Belden Ave. N.E., Canton 5, Ohio.

For More Details Circle No. 428—Page 193

FIRE EXTINGUISHER

Portable 2½-gal pressurized water extinguisher requires no bumping or inverting to activate it. A 45-ft stream is provided by snapping back the locking lever, aiming the nozzle at the base of the fire, and squeezing the one-hand grip. Spring-loaded valve gives complete on-off control. No annual recharge is required, and the unit can be pressurized on any standard air hose carrying 100 psi. Made of stainless steel, the extinguisher is 26½ in. high and 7 in. in diam. It has been tested and approved for use on Class "A" fires by Underwriters' Laboratories and Factory Mutual.—**Walter Kidde & Co.**, Belleville, N. J.

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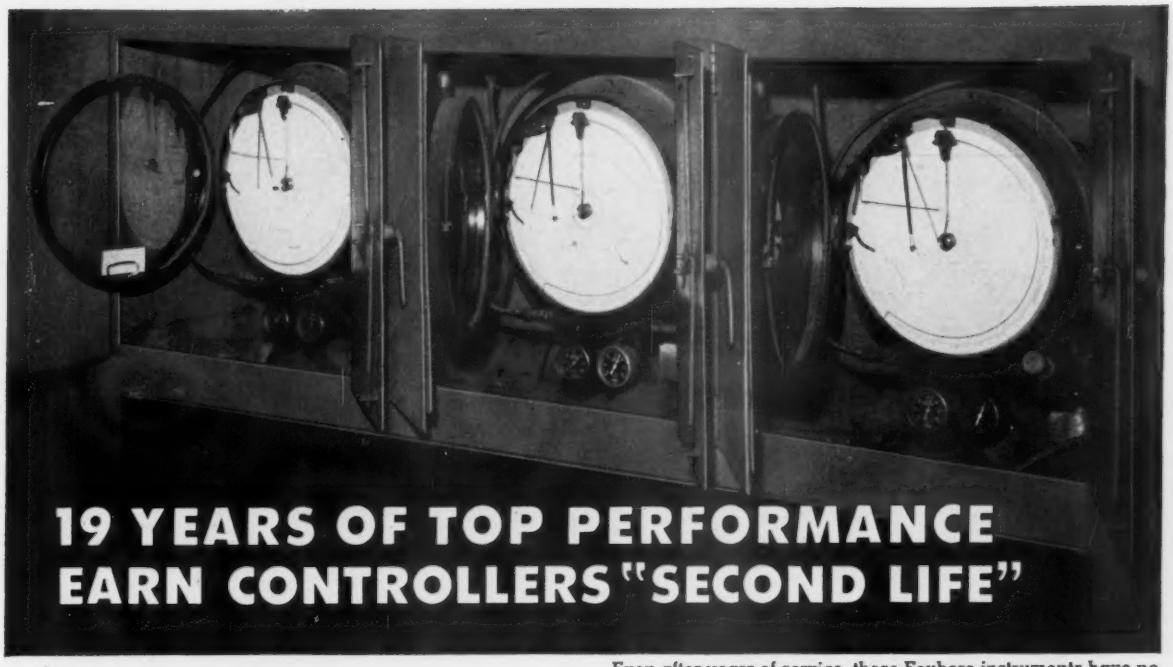


19 YEARS OF TOP PERFORMANCE EARN CONTROLLERS "SECOND LIFE"

Even after years of service, these Foxboro instruments have no trouble holding cupola blast air at ±2% accuracy. High repeatability assures consistently uniform melts.

General Metals re-installs dependable Foxboro Air Weight Controllers in brand new foundry

When General Metals Corporation, Oakland, Calif., built its new multi-million dollar foundry, all major equipment was replaced. Everything, that is, except their Foxboro Air Weight Controllers. These instruments, installed in their old foundry back in 1938, were moved right along into the new plant.

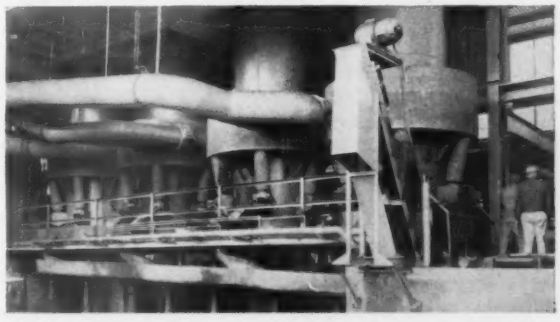
And with good reason, too. In 19 years of service the Controllers had never been taken off the line for maintenance or repair. The only attention they'd ever received was routine 6-month service check-ups.

In General Metals' new foundry, the Air Weight Controllers meter air to four #7 cupolas, holding it well within specified ±2% accuracy limits. And the Foundry Manager also reports that repeatability is practically perfect, giving him high uniformity in the quality of his gray iron.

You can keep the quality of your castings uniform with Foxboro Air Weight Controllers. Today's models are improved in design — even more in accurate performance. Find out about them by writing **The Foxboro Company, 327 Neponset Ave., Foxboro, Mass.** Ask for Bulletin 10-10.

General Metals' new west coast foundry

Built in 1955 at a cost of 5 million dollars, it's one of the most modern and up-to-date on the West Coast. Foxboro Air Weight Controllers, 19 years old, performed so well they were re-installed in the new foundry.



Blast air to these four #7 Whiting cupolas is metered by Foxboro Controllers that have never been repaired — never taken out of service for maintenance.

FOXBORO REG. U.S. PAT. OFF **AIR WEIGHT CONTROLLERS**

Casting Theory and Practice

. . . . Discussed at AFS TECHNICAL

SUBJECTS related to the newer foundry processes attracted major interest at the technical sessions held during the recent AFS Congress in Cleveland under the sponsorship of 15 divisions and committees of the society.

Shell molding was discussed at several sessions, one being devoted to shell mold patterns and coreboxes. The subject also was treated at a steel session and at one of the sand sessions. The CO_2 process came in for a good share of attention, with a large audience present for a sand session at which three papers were presented concerning the subject.

Recent formation of two new AFS divisions—Ductile Iron and Die Casting & Permanent Mold—was reflected in the technical program. The latter division sponsored two technical sessions and was co-sponsor of a luncheon meeting with the Light Metals Division. Three papers relating to various phases of nodular iron were given at one of the gray iron meetings.

Shop course discussion of the practical side of foundry operations maintained its usual popularity. Six courses were presented, two each by the Gray Iron and Malleable Divisions and one each by the Sand and Brass & Bronze Divisions. The various metals divisions also sponsored roundtable luncheons, while the Sand Division drew a large audience to its annual dinner session. At the latter affair, Clyde A. Sanders, American Colloid Co., Skokie, Ill., told about what European foundrymen are doing, and A. H. Homberger, American Automation Corp., Ann Arbor, Mich., presented a film describing the Buhrer automated molding and pouring method (see June FOUNDRY, Page 70).

MALLEABLE IRON

IN TWO technical sessions and a roundtable luncheon, malleable foundrymen discussed pinhole defects, steel scrap specifications, maintenance, annealing, and microstructures.

At the opening session, R. W. Heine, University of Wisconsin, Madison, Wis., in **Observations on Pinhole Defects in White Iron Castings** stated that there are four causes. Those sources he termed as reaction, aspiration, evolution, and miscellaneous. Reaction type pinholes result from iron-oxide-rich slag being carried into the mold cavity and reacting with carbon in the metal; such pinholing is the most prevalent. Remedy is suitable gating to trap slag before entry, keeping molding sand free from scale and dirt, proper mulling of sand to maintain correct moisture distribution, and the right moisture level.

Steel Scrap Specifications for Duplexing Cupola White Iron by R. H. Greenlee, Auto Specialties Mfg. Co., St. Joseph, Mich. Use of clippings, busheling, and other light scrap causes high melting losses and inability to control metal composition. Investigation of nearly 1200 tons of charged material using light steel scrap showed a melting loss of 6.8 per cent while the melting of nearly 3000 tons of charged material using medium and heavy steel scrap had a loss of only about 4 per cent.

To insure good quality hydraulically compressed bundles of steel clippings, his firm inspects the source of clippings for cleanliness and alloy content. Approval then is given to the scrap dealer for compressing and shipping, and when shipments arrive at the plant they are inspected by laboratory personnel. Since that system has been established, more uniform melting has been obtained, silicon and manganese losses have been reduced, and the annealing cycle has been shortened.

Your Foundry and Preventive Maintenance by C. E. Fausel, Central Foundry Div., General Motors Corp., Danville, Ill. Importance of maintenance was indicated by the

SESSIONS

statement that 8 per cent of all employees in this plant are maintenance men. To avoid breakdowns in equipment maintenance should be performed on a predetermined schedule. In the procedures followed, cards indicating the inspection, repairs, etc., of each piece of equipment are given to the maintenance men who, after performing the work, initial the cards and return them to the maintenance department office.

Annealing of Malleable Iron: Effect of Repeated Annealing on the Rate of Second Stage Graphitization by J. E. Rehder and J. E. Wilson, Canada Iron Foundries Ltd., Montreal. In this investigation, a large number of test bars made from a regular malleable heat containing 2.52 per cent carbon and 1.50 per cent silicon were subjected to repeated annealing, followed by bend tests and Rockwell hardness tests. As the number of reheatings increased up to a maximum of six times, the hardness decreased gradually but appreciably. Also, as reheatings increased, the rate of cooling through the critical range could be increased. This ranged from 20 degrees per hour with one reheat to 70 degrees per hour with six reheatings.

Salt Bath Heat Treatment vs Quench and Temper: Standard and Pearlitic Malleable by P. W. Green, General Electric Co., Erie, Pa. Under the same temperature conditions in salt bath and oil quenching and tempering, the tensile strength of regular malleable iron was higher than in pearlitic malleable. In the case of pearlitic malleable containing 0.75 to 0.85 per cent manganese, the tensile strength was higher in the oil quench and temper treatment than that obtained in the salt bath treatment.

Malleable Iron Microstructures, Effect and Cause was a report of the Controlled Annealing Committee of the Malleable Division which was presented by L. R. Jenkins, Wagner Malleable Iron Co., Decatur, Ill. This report contained 35 micrographs showing normal as well as some defective structures and descriptions of each, and is intended as a guide rather than a standard.

The malleable industry can share in the expanding economy predicted for future years, it was stated by Lowell D. Ryan, executive vice president, Malleable Founders' Society, in speaking before the Malleable Division roundtable luncheon. The major requirements for success, he said, include effective merchandising, greater diversification in applications of malleable castings, and high-quality personnel.

Recent growth in consumption of pearlitic malleable (150,000 tons last year) represents numerous new markets for the industry and is an important factor in the trend toward diversification. How well the industry is able to convert those applications which would be best filled by castings will have much to do with the extent of the total market for malleable castings in the future.

STEEL CASTINGS

THREE technical sessions and a roundtable luncheon highlighted the program of the Steel Division. Among subjects discussed were refractory life in an electric furnace with water-cooled shell, toughness of cast mild steels, cast age hardening austenitic steels, specifications for mold and core sand binders, and shell molding for steel castings.

Improving Electric Furnace Refractory Life by Special Shell Cooling Techniques, by Vernon J. Howard, melting foreman, Oklahoma Steel Castings Co. Div., American Steel & Pump Corp., Tulsa, Okla. The equipment to which the cooling system was applied is a 2-ton, direct-arc, top-charge, acid-lined furnace employing an 8-in. electrode. The furnace is covered with a dust collector. Average size of heats is 7700 lb. Powered by a 2000-kva transformer, the unit

makes all types of steel from plain carbon to AISI 347 stainless. At capacity it can produce 22 heats a day.

Changes made in the furnace include the roof design—to eliminate the flange on the outer edge of the ring—and a redesign of the electrode ring coolers to allow a greater flow of water through the chambers. Glands were installed around the entire shell, with a backing of loose-dry ganister between the shell and the lining brick. Good results were attained in lining life and power consumption per ton despite a higher average tapping temperature, the result of changes in shop operations. Installation of a simple cooling system for the furnace room is being studied.

Some Factors Affecting the Toughness of Mild Steel Castings, by H. H. Fairfield and J. A. Ortiz, Los Angeles Steel Casting Co., Los Angeles. Presented by Mr. Fairfield. The investigation concerned effects of various steelmaking operations during melting as well as the influence of sulfur, carbon, and hydrogen on ductility. Reduction of area is used as the measure of toughness.

Conclusions: 1. Sulfur over 0.03 per cent causes lowered ductility. 2. Carbon contents above 0.33 per cent result in lower toughness than 0.23-0.30 per cent carbon steel. 3. Each part per million of hydrogen may lower reduction of area by 10 per cent. 4. Boiling the bath improves metal quality. 5. The amount of FeO in the slag before tapping affects the reduction of area. 6. Metal in the furnace should always contain FeO to assure against hydrogen pickup. 7. Tapping temperature must be high enough to allow entrapped nonmetallic inclusions to float to top of the ladle. 8. Tapping must be done so as to prevent slag-metal reaction in the ladle.

The Electric Arc in Melting Furnaces, by W. E. Schwabe, National Carbon Co., Division of Union Carbide Corp., New York. Expansion in use of electric furnace melting is due to the characteristics of the electric arc. The illuminating arc has been studied previously, but little study has been given to the melting arc. This paper detailed the study of the latter.

Effect of Vanadium on the Mechanical Properties of a 1 Per Cent Chromium, 1 Per Cent Molybdenum Cast Steel, by R. S. Zeno and L. D. Tote, General Electric Co., Schenectady, N. Y. Presented by Mr. Zeno. Purpose of this study was to determine the effect of vanadium content on the high and low-temperature mechanical properties of these steels. The steels were tested in the normalized and tempered condition at comparable hardness levels.

Conclusions: 1. A significant increase in rupture strength occurred at the higher parameter numbers (M = 36,000 - 39,500). 2. Increasing vanadium from 0.04 to 0.22 per cent lowered the rupture ductility. 3. Tensile and yield strengths appeared unaffected as a result of increasing the vanadium content from 0.23 to 0.54 per cent. 4. Increasing vanadium from 0.04 to 0.22 per cent increased the energy and fracture appearance transition temperatures approximately 95° F and 66.2° F, respectively. 5. Bainite became finer with vanadium additions to 0.40 per cent and smaller with the 0.54 per cent vanadium.

Factors Influencing the Resistance of Steel Castings to High Stress Abrasion, by T. E. Norman, metallurgical engineer, Climax Molybdenum Co., Denver. Abrasion resistance of heavy section castings was studied by service tests on ball mill liners and by a short-time test procedure which correlates well with results on actual liners. The short-time test makes it possible to determine effects of many more variables in composition, structure, and heat treatment than could be determined by many years of testing on actual liners.

Martensitic, pearlitic, and austenitic steels, mainly with high-carbon contents, were studied. In general, the martensitic steels had better abrasion resistance than the pearlitic steels. A fairly wide range of abrasion factors is possible for each microstructure, depending on such factors as carbon content, austenitizing temperature, tempering temperature, alloy content, and, for pearlite, the fineness and resultant hardness developed in the pearlite structure.

Austenitic steels gave the greatest range in abrasion factors, depending largely on their composition. It is possible for "lean-alloy" high-carbon austenites to show substantially better abrasion resistance than the conventional 12 per cent manganese, austenitic steel.

The abrasion factors for the various steels which were studied apply specifically to the operating conditions in the primary grinding mills at Climax. Data from grinding tests on relatively pure minerals of different hardness indicate that the range in abrasion factors will normally be greater when grinding the softer minerals than when grinding quartz or any other very hard minerals.

Cast Age Hardening Austenitic Steel, by E. A. Lange, N. C. Howells, and A. Bukowski, Metal Processing Branch, Metallurgy Division, Naval Research Laboratory, Washington. Presented by Mr. Lange. Naval engineers designing hardware for minesweepers are handicapped because they lack suitable high-strength, nonmagnetic casting alloys.

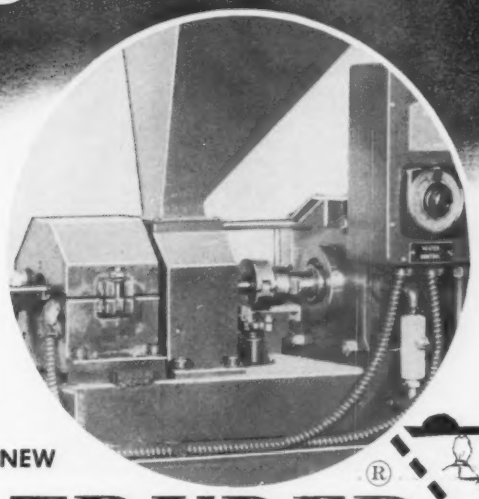
Nonferrous alloys and the conventional austenitic steels have limitations in yield strength, modulus of elasticity, endurance limit, or machinability. In recent years, compositions of wrought steels with austenitic microstructures have been developed that can be age hardened to high hardness levels and yield strengths of 88,000 to 147,000 psi.

Applicability of three types of these wrought alloys for use in castings was investigated. A fourth type of alloy having no direct wrought counterpart was developed

Foundrymen who attended the second malleable iron session heard three discussions. They concerned effect of repeated annealing on rate of second-stage graphitization, salt bath heat treatment versus quench and temper, and malleable iron microstructure effect and cause

THE MACHINE THAT

"STOPPED the SHOW"



INTRODUCING

THE *Revolutionary* NEW

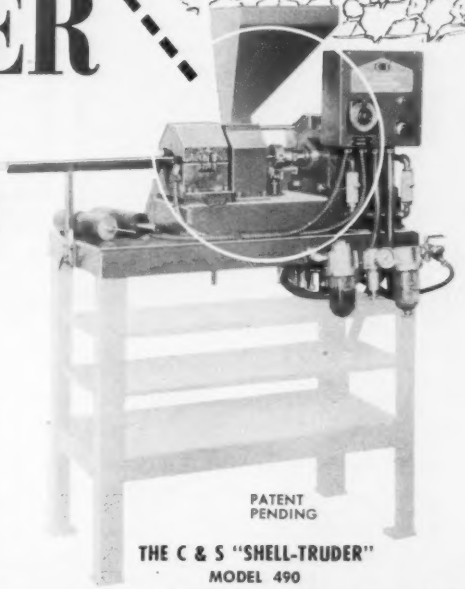
SHELL-TRUDER®

Automatic

STOCK CORE MACHINE

by C&S

The overwhelming response to the new "SHELL-TRUDER" on the part of visitors to this year's Foundry Show is now a matter of record. Rarely, if ever, has a single machine caused such a stir among foundrymen. And small wonder! For here is a continuous extruder which simply and automatically produces hollow or solid pin cores *at an initial cost which is actually nominal!* Investigate the facts below and see how a "SHELL-TRUDER" can help you cut production costs without sacrificing quality. We are now accepting purchase orders.



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that contains a minimum amount of nickel.

A Cr-Ni-P austenitic steel with 0.3 per cent C and 0.25 per cent P developed yield strengths of 100,000 psi. The Cr-Mn austenitic steels containing phosphorus or vanadium were age hardenable, but castings of these alloys were brittle when heat treated to high strength levels. Modifying the wrought Cr-Ni-Mn-C composition resulted in an alloy with good ductility and yield strengths at the 100,000 psi level.

The investigation showed that age-hardening characteristics can be induced in a manganese stabilized austenitic steel by vanadium. With this fourth type of steel, which is designated as Mn-V, a minimum of 0.3 per cent V is necessary to obtain yield strengths of 100,000 psi.

Purchase Specifications for Commonly Used Steel Foundry Mold and Core Sand Binders, by E. G. Vogel, research engineer, Lebanon Steel Foundry, Lebanon, Pa. Materials discussed are bentonite, corn cereal flour, core oil, plastic core binder, and cold set oil. The report covers tests involving conventional sand batch properties using standard production sand mix formulas for core oil and liquid phenolic binder evaluations. Purpose of these tests is to control quality of sand binder purchases.

The paper lists numerous tests employed and methods and equipment utilized in carrying out the testing program. The author comments that the liquid limit test for bentonite is promising since it is quick and may allow discontinuance of some of the other tests.

Shell Molding for Steel Castings, by R. G. Powell and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass. Presented by Mr. Powell. This work describes techniques for adapting shell molding to the manufacture of low-carbon and low-alloy steel castings regardless of section size.

Surface defects generally occurring on low-carbon and low-alloy steel castings in shell molds can be eliminated by use of chill-type molds. Such molds can be made with forsterite or with simple blends of granulated limestone and silica sand. Best results are obtained when these materials are used in composite shell molds having a thin facing of fine silica sand made by a double investment process.

At the roundtable luncheon W. R. Hibbard, General Electric Co., Schenectady, N. Y., presented **A Metallurgical Report on Russia.** Last fall Dr. Hibbard was a member of a delegation of United States engineers and metallurgists which briefly toured metals research institutions in the USSR as guests of the Russian government. The speaker's presentation consisted largely of colored slides and an accompanying narration explaining them. Because of the briefness of the visit and the limited opportunity to see the metals research activities, he made no pretense of speaking with authority or of drawing conclusions beyond what he actually saw.

Dr. Hibbard emphasized that metals research work is being done on a broad scale and painstakingly. It is his feeling that the United States should be concerned about the extent of the Russian research and the progress which may be accomplished.

He did not see any privately sponsored or industrial research—only that initiated and carried out by the government. An interesting point Dr. Hibbard mentioned is that engineers do not become foundry engineers because they have some interest in that industry—rather they are admitted to it only after having been formally trained as foundry engineers. The freedom of choice common in the American engineering profession is not permitted.

PATTERNMAKING

A VARIED PROGRAM for patternmakers included discussion of shell mold pattern and corebox equipment, pattern standards, plastic patterns and coreboxes, and the part patternmakers play in selling castings. These topics were covered at three technical sessions and a luncheon.

Construction of Shell Mold Patterns and Coreboxes by W. A. Wright, Woodruff & Edwards Inc., Elgin, Ill. Patterns for shell molding must be designed for that purpose. Gray iron, steel, brass, and aluminum all are acceptable materials, but the best application of each varies. No one possesses all the most desirable characteristics. These points should be kept in mind:

1. Stabilize material to prevent growth and distortion. 2. Use like materials in a given piece of equipment. 3. With separate cope and drag patterns, keep them as uniform in mass as possible. 4. With high, thin projections on patterns, extend insert or cavity all the way through the baseplate. Insert cavities from the nonworking side of the pattern. 5. Radius external corners of gates, runners, etc. 6. Where possible, standardize pattern parts. 7. Coat threaded areas with protective material. 8. Beware taking off too much stock. Err on the high side. 9. Use of inserts is less expensive in long-run work. 10. Remember that cold cores are placed in hot molds and thus must be the correct size to fit properly. 11. Use a minimum $\frac{1}{2}$-degree draft on vertical surfaces for maximum tool life.

Gating and Risering Shell Mold Pattern Equipment by D. C. Kidney, Westinghouse Air Brake Co., Wilmerding, Pa. Standards for shell molded castings are high, and the patterns must be good. Green sand and shell mold gating and risering are very similar, but gating and location of parting are extremely important in shell mold patterns. If fin or flash at parting must be cut off, locate them so that a straight cutoff is possible. Don't crowd the pattern.

Know pattern costs and estimate them properly. Don't drive off buyers with high prices, or they will go to another form of production. Keep the importance of pouring time in mind in the design of gates and runners, and use like material for the plate and the gates and risers.

If the gating system is made of component parts, they must be fitted accurately. One-piece gating is preferable. Since metal always can be removed, work to over size. Use of several gates assists even distribution of metal, and risers assure casting soundness. Choke aluminum castings, and use strainers to eliminate dross. Avoid a free drop of metal. Swirling and agitation cause intake of air and disturb feeding.

Work closely with the foundry, and make trial runs in green sand to avoid reworking. Standardize as much as possible, and don't cross ingates over runners. Use a standard runner and work from it as required.

Pattern Standards for Practical Foundry Usage by E. A. Geary,

Trafford Foundry Div., Westinghouse Electric Corp., Trafford, Pa. Patternmakers are dependent on the sand casting industry, and its welfare depends on reducing costs and improving quality of its products. To achieve these ends, the industry has moved to increasingly varied, mechanized forms of mold production, and this trend has made patterns more elaborate and more costly. Foundries concentrate on long-run jobs, and some try to make castings on mechanized units when the run does not justify the step. Patterns for such jobs are so expensive that casting cost can't be reduced, thus defeating the original purpose.

Casting buyers often have a pattern made on the basis of their original order, then reorder on it indefinitely. Anticipated activity of a pattern is basic to a decision on what type it should be. At Trafford, five classes of patterns have been established: 1. Low-cost equipment for one or two castings. 2. Low-activity, short-life equipment (five to ten per year for five to ten years) for 50 to 100 castings. 3. High-activity, short-life equipment (100 to 200 per year for 5 to 6 years) for 600 to 850 castings. 4. Low-activity, long-life equipment (100 to 300 per year for 10 years) for 1000 to 3000 castings. 5. High-activity, long-life metal equipment limited as to number only by production facilities.

When foundries buy patterns of the proper class, costs are more predictable, and the pattern shop can use the right material and do the job correctly. The foundry then gets patterns built to run on its equipment and to produce good castings for the life of the design. Foundry and pattern shop co-operation are vital for both.

Where Do We Start?—You Must Tell Us!—This portion of the session was a forum designed to kick off work of re-established Committee 7-G on Pattern Standards. Committee members are D. T. Kindt, Kindt-Collins Co., Cleveland; R. L. Olson, Dike-O-Seal Inc., Chicago; H. A. Burton, Canadian Steel Foundries, Montreal; and F. T. Watson, Shell Chemical Corp., Cleveland.

"I know that the casting is shown in cross section, Cassidy, but—"

Suggestions were made by the audience for various types of desirable pattern standards. The committee hopes to have tentative standards ready for consideration by next year.

How Patternmakers Can Help To Sell Castings by George K. Dreher, Steel Founders' Society of America. Speaking at the pattern roundtable luncheon, Mr. Dreher stated that the foundry industry has improved castings processes and quality of castings greatly in the last 20 years. Many variables have been brought under control but many remain, some which involve patternmakers.

The user of castings ultimately is the man who uses machinery which incorporates them. The machinery builder must be able to sell him on the use of castings in the equipment he buys. Patternmakers should help foundrymen do their job so that castings are sold and used. Bad castings are a blow to the entire foundry industry, even though the foundry which made them eventually fails. Fortunately, other forms of fabrication have the same problem.

Patterns should be used for the purpose for which they were made. Patternmakers not only must do good jobs, but also should educate pattern buyers to ask for them. To produce superior equipment, patternmakers need engineers, just as the foundry industry does. Such men may be graduate engineers, good mechanics, or just intelligent men. They must know that foundries need to make good castings. They must integrate pattern technology, foundry technology, and design engineering of customers.

Cost reduction also is of vital importance to pattern shops. They must help the foundry and the designer by explaining when design changes, better equipment, etc., will improve the product and cut costs. Checking procedures, locating points, and other matters can be agreed on down the line. Shrinkage problems need to be solved, too. Control is becoming more and more important. Reproducibility cuts costs, and that is what the casting buyer wants. The pattern shop should work with the foundry to achieve it.

Robert LeMaster, R. A. Nelson Pattern Co., Milwaukee, stated that considerably more than **A Little Knowledge of Plastics** is required in proper application of those materials in pattern construction. Expert

Opening pattern session attracted a full house, including standees. Papers at this meeting dealt with construction of shell mold patterns and coreboxes and gating and risering of shell molding pattern equipment

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knowledge of the advantages and disadvantages of the materials is necessary, and closer co-operation between plastic formulators and pattern fabricators is essential to develop the most satisfactory techniques of construction. That will lead to improvement in the materials themselves and also to a broader application.

Construction Hints and Wear Characteristics of Plastic Patterns and Coreboxes by V. E. Zang, Unitcast Corp., Toledo, O., described the various details employed in producing epoxy resin patterns for production of light-sectioned, cast steel hopper door frames for railroad coal cars. Patterns are 48 x 60 in. for use on diaphragm-type molding machines. Patterns formerly were made of bronze and used with sand-slingers. Cost of the plastic patterns was reported to be from one-third to one-half that of metal type, depending on the method of figuring and the type of pattern.

At present some 50,000 molds have been produced from each of eight patterns, and they are still in good shape. Coreboxes of the same material have turned out over 50,000 cores without appreciable wear. Repair of damaged areas as well as the making of engineering changes are accomplished easily through use of plaster enclosures and pour-type resin.

GRAY IRON

ACTIVITIES of the Gray Iron Division consisted of three technical sessions and a roundtable luncheon. Among subjects featured in formal papers were ferritization, magnesium content and graphite forms, and structural considerations in nodular iron; hydrogen pickup from sand molds and risering of gray iron castings; and cupola operation and ladle practice.

A Study of the Ferritization of Nodular Iron, by Earl J. Eckel, professor of metallurgical engineering, University of Illinois, Urbana, Ill. Attainment of maximum ductility in nodular iron usually requires application of some heat treatment. Survey of the literature reveals numerous recommendations for carrying out the necessary heat treatment. This investigation evaluated the various possible methods of annealing with regard to efficiency, practicability, and properties of the resulting products.

Nodular irons of two compositions were subjected to four different types of ferritizing heat treatment: 1. Slow cooling through eutectoid range. 2. Quenching to and holding at temperatures both below and above the critical temperature for isothermal transformation. 3. Reheating of pearlitic structures to various temperatures ranging from below to above the critical temperature. 4. Tempering of martensitic structures.

Results of the treatments were compared on the basis of rate of response, tensile and impact properties of the treated specimens, and quantitative metallography.

Magnesium Content and Graphite Forms in Cast Iron, by J. F. Ellis, metallurgist, and C. K. Donoho, chief metallurgist, American Cast Iron Pipe Co., Birmingham, Ala. Presented by Mr. Donoho. Effect of increasing magnesium content in three different base irons on tensile properties and graphite structures are determined. The transition structures in changing from flake graphite to spherulitic graphite are shown and discussed. Also the effect of excessive magnesium content on graphite form is shown. An extension of the standard system of graphite classification is suggested.

Although pointing out that some obvious gaps in the study point to the need for further work, the authors give these tentative conclusions:

1. In hyper-eutectic iron, increasing magnesium causes a gradual disappearance of graphite flakes in favor of true spherulites.

2. In hypo-eutectic iron, increasing magnesium causes disappearance of true flake graphite in favor of "quasi-flake" graphite form, and then true spherulites.

3. In very low manganese hypo-eutectic iron, spherulites appear at a much lower magnesium level.

4. Excessive magnesium (over 0.14 per cent for the irons studied) causes the appearance of a "spikey" graphite form with some deterioration of properties.

5. Where spherulites and eutectiform graphite occur together in hypo-eutectic iron, it is shown that the spherulites form first and are contained in the austenite dendrites.

6. A proposed German classification chart for graphite forms associated with spherulitic graphite irons is shown to compare reasonably with the various forms observed in the study.

Some Structural Considerations in Nodular Iron, by Verne Pulsifer, research metallurgist, Armour Research Foundation of Illinois Institute of Technology, Chicago. Purpose of this paper was to clarify some aspects of the mechanism of nodular iron solidification.

There is no direct evidence to show precisely when nodules first form during solidification. To clarify this point, a technique of shotting the liquid metal in water was used to obtain extremely fast quenching rates. Cooling of the smallest pieces of shot required intervals on the order of 3 sec. Comparison of the resulting shot structures led to some fairly strong conclusions to be drawn regarding the growth rate of graphite nodules.

The author proposes that nodules form near the liquidus in a normal nucleation process rather than near or below the solidus. This theory is supported by several observations, including studies of the rapidly chilled shot. A diagram presented explained the mechanism and the structures resulting from the formation of magnesium sulfide in nodular iron.

Gases in Cast Iron with Special Reference to Pickup of Hydrogen from Sand Molds, by J. V. Dawson and L. W. L. Smith, British Cast Iron Research Association, Birmingham, England. Presented by H. E. Henderson, Lynchburg Foundry Co., Lynchburg, Va.

Determination of oxygen, hydrogen, and nitrogen in cast irons is difficult, but in recent years suitable methods have been developed. Not the least among the problems is provision of a suitable sample, but it has been shown that a small cylinder, chill-cast in a graphite mold, gives most reproducible results and is convenient to handle. This sample is not ideal for hydrogen determinations because of loss of hydrogen during cooling, but the results are suitable for comparison. Tests have shown that the loss of hydrogen is small, particularly when the total hydrogen content is low.

Metal has been sampled at a number of diverse plants covering a wide range of melting units and compositions. Oxygen contents ranged between 4 and 100 ppm,

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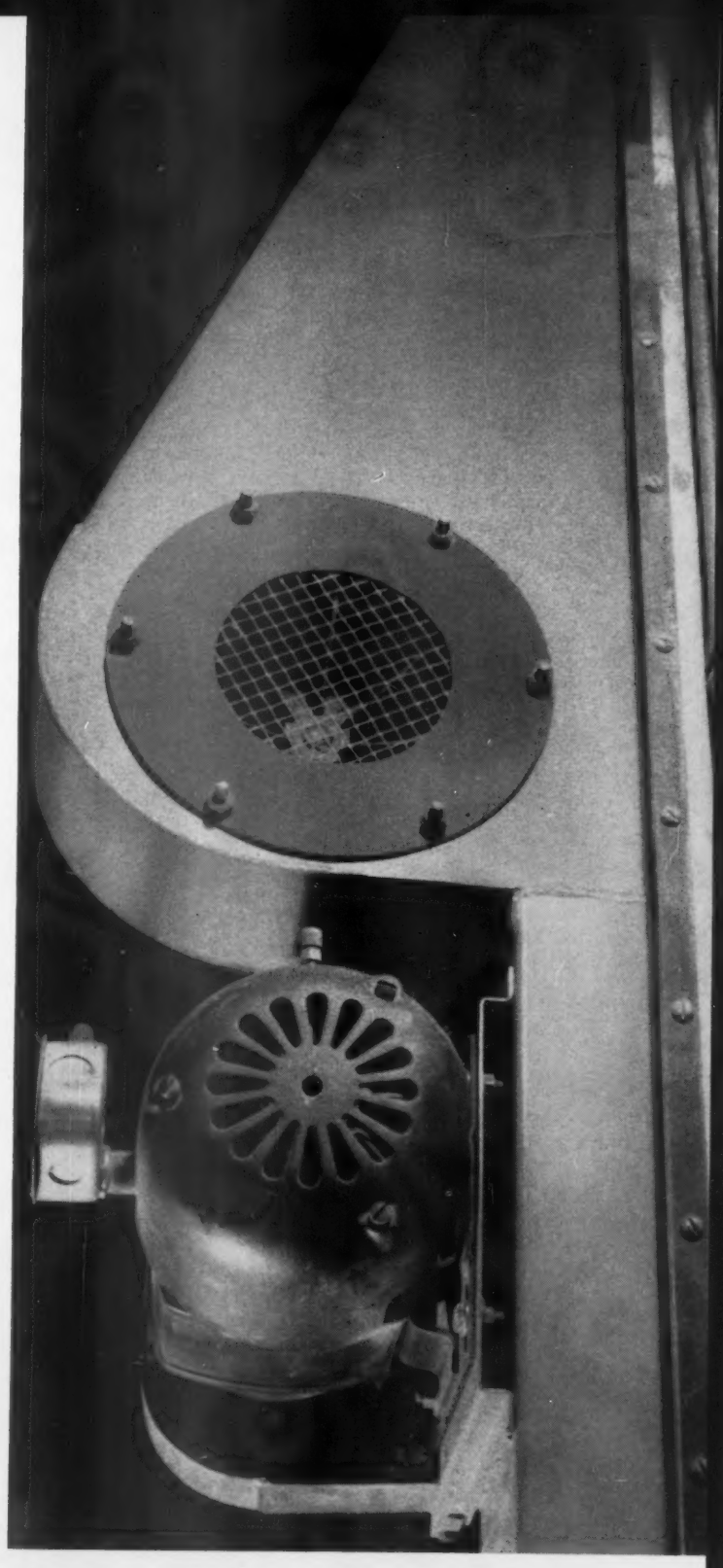

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nitrogen between 15 and 140 ppm, and hydrogen between 0.8 and 2.7 ppm in normal, unalloyed irons. These hydrogen figures may be slightly low due to the sampling method employed.

A number of conclusions were arrived at, and for purpose of comparison each refers first to the pinholing tendency, and second to hydrogen pickup from the mold:

1. Aluminum contents between 0.01 and 0.10 per cent cause pinholing in gray iron and very markedly increase hydrogen pickup.

2. Aluminum contents over 0.2 per cent reduce the pinholing tendency in gray iron and decrease hydrogen pickup.

3. If titanium is absent, aluminum is less likely to cause pinholing in gray iron, but titanium has little effect on hydrogen pickup either by itself or with aluminum.

4. Magnesium contents up to 0.1 per cent in the absence of aluminum do not cause pinholing, but the hydrogen pickup increases proportionately.

5. Extremely small amounts of aluminum cause pinholing in the presence of 0.04-0.06 per cent magnesium, and also increase hydrogen pickup.

6. When magnesium content is greater than 0.1 per cent, aluminum is less likely to give pinholing even though the hydrogen pickup is still increased by the aluminum.

7. Aluminum content of commercial ferrosilicon can cause pinholing when used as an inoculant in nodular iron, and the hydrogen pickup is increased as with aluminum alone.

8. Aluminum is more likely to cause pinholing in nodular iron when about 0.04 per cent titanium is present, although it can occur with very much lower titanium contents. Hydrogen pickup is unaffected by the titanium.

9. Increasing the magnesium content above 0.1 per cent in presence of aluminum reduces the pinholing tendency and is inclined to reduce hydrogen pickup.

10. Aluminum in excess of 0.2 per cent reduces pinholing in nodular iron and reduces the hydrogen pickup.

11. Manganese contents over about 4 per cent give pinholing and an extremely high hydrogen pickup.

12. Bismuth additions of 0.02 per cent limit pinholing in gray iron but do not affect hydrogen pickup.

13. Coal dust additions to the sand considerably reduce the pinholing tendency but slightly increase hydrogen pickup.

14. Addition of pitch to the sand strongly reduces the pinholing tendency without affecting hydrogen pickup.

15. Use of wood flour in the sand reduces pinholing a little and slightly reduces hydrogen pickup.

16. Lowering pouring temperature tends to move pinholing from thin to thick sections. Hydrogen pickup is reduced between 1450 and 1400° C, but reducing the temperature below this has little effect on hydrogen pickup.

Risering of Gray Iron Castings, by J. F. Wallace and E. B. Evans, associate professor and assistant professor, respectively, Department of Metallurgical Engineering, Case Institute of Technology, Cleveland. Presented by Prof. Wallace. In this progress report of the research project sponsored by the AFS Gray Iron Division, the technical literature on the risering of gray iron was reviewed and the pertinent variables evaluated. A recommended risering procedure for gray iron castings is advanced based on available data and some original concepts and calculations.

An initial report on the project covering gating and a subsequent article on the problem of mold wall movement appeared in 1957. The risering procedures recommended in the current report are designed to produce a casting true to pattern and free of all shrinkage porosity. Charts to determine required risers are given, as are sketches of preferred shapes of risers and riser necks.

Adequate risering of gray iron castings is complex because of the many variables influencing the melting, casting and solidification of gray iron in sand molds. It is possible, however, to make several statements concerning good risering practice for general application:

1. A low phosphorus content (below 0.10 per cent) is desirable to eliminate microporosity.

2. Adequate riser size must be selected to compensate for liquid and solidification contraction in all molds, and also for some mold cavity enlargement in green sand molds.

3. The mold cavity in dry sand, core, or CO_2 process molds does not expand significantly during solidification of gray iron castings; in fact, a reduction in the mold cavity occurs in heavy-section castings in dry sand molds, or when extensive coring is employed. Size of the required risers can be reduced accordingly in these instances.

4. Feeding distance in gray iron is generally greater than that for steel, and it decreases with lower carbon content.

Progress report of the Joint AFS-AWS Committee on Welding was presented at the second gray iron session. J. S. Vanick, metallurgist, International Nickel Co. Inc., New York, is chairman of the committee, which was organized in 1954 to determine the accuracy of specifications which said that iron castings should not be welded. Since that time, activities of the committee have been broadened to include ductile iron and malleable cast iron as well.

Mr. Vanick explained that only progress can be reported at this time. Test bars of the various materials have been made and tested, but results have not been studied sufficiently for conclusion to be drawn or recommendations made regarding which types of welding

Gray iron session on Thursday morning heard papers on gases in cast iron with special reference to pickup of hydrogen from sand molds, the risering of gray iron castings, and a progress report on welding

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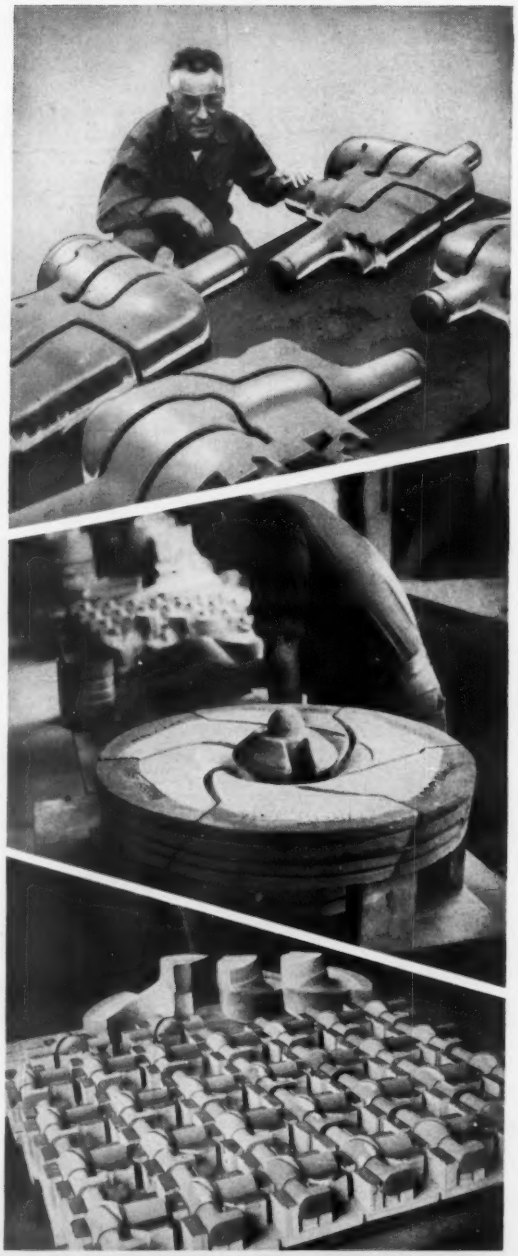

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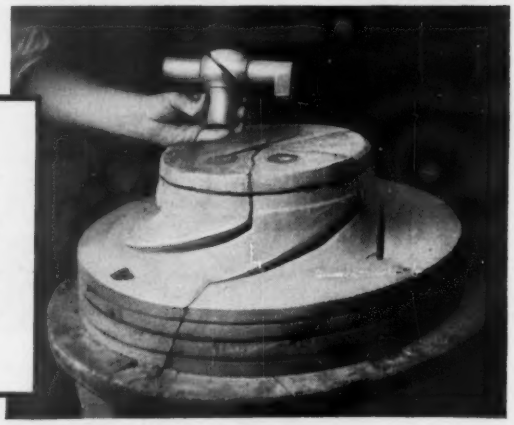


produce the best welds. Mr. Vanick asserted that, in his opinion, the welding of gray iron both for repair and for joining components into structures some day will be an accepted practice.

Participating in the progress report were Sidney Low, Chapman Valve Mfg. Co., Indian Orchard, Mass., on welding gray iron; Walter Edens, research supervisor, Allis-Chalmers Mfg. Co., Milwaukee, on welding ductile iron; and S. T. Walter, mechanical engineer, Air Reduction Sales Co., New York, on welding malleable iron.

The Controlled-Slag Hot Blast Cupola, by D. Fleming, foundry consultant to the Textile Machinery Makers Ltd., Oldham, England. Officially sponsored by the Institute of British Foundrymen, Manchester, England, and presented by R. W. Kraft, University of Michigan, Ann Arbor, Mich.

In 1947-49, the author engaged in a study of reactions in the cupola. Particular studies were made of carbon pickup, the thermodynamics of sulfur removal, the factors influencing silicon and manganese loss, and their interrelation with combustion conditions.

By 1950 this work had resulted in the issue of an internal company report defining the principles for a hot-blast, continuous tapping cupola with a water-cooled melting zone and tuyeres and a neutral well. It was proposed to produce gray iron for textile castings from cast iron and steel scrap with ferroalloy additions and without use of pig iron. Heretofore, the necessary carbon pickup and sulfur reduction were obtained by using mildly basic slags of controlled composition.

The current paper still forms a reasonable basis for the consideration of the principles of cupola reactions, and it is believed the general conclusions are valid.

It has long been known that cupola efficiency could be improved theoretically by use of higher blast temperatures, with greater return of the normally wasted latent and sensible heat of the effluent via the blast. It is d o u b t e d , however, whether previously the refractory-lined standard cupola would have survived for long. It is believed that the type of cupola described now allows very high combustion zone temperatures to be used.

Foundry Applications of the Calcium Carbide Injection Process, by W. R. Lysobey and A. E. Tull, Air Reduction Sales Co., New York. Presented by Mr. Lysobey. Better cast iron results from good inoculating techniques. An effective inoculant will lower the chill-forming tendency of cast iron and promote the formation of Type A graphite in a pearlitic matrix.

Presence of Type D graphite in combination with ferrite is a clue to many of the problems encountered in cast iron founding. This structure often is coupled with white iron or chill formation in adjoining areas which undergo rapid cooling. Many of the difficulties associated with porosity and shrinkage can be eliminated or greatly lessened by techniques to produce iron that has Type A graphite and a pearlitic matrix. The injection of calcium carbide in cast iron has such an effect.

Effect of Size of Scrap on the Tapping Temperature of the Cupola, by H. N. Keyser, assistant chief, Battelle Memorial Institute, Columbus, Ohio, and W. L. Kann Jr., vice president, Globe Steel Abrasive Co., Mansfield, Ohio. Presented by Mr. Keyser. Purpose of this paper was to determine a means of predicting cupola performance on the basis of the heaviness or lightness of the cast scrap being charged.

The 54-in.-diam cupola was operated with constant blast and constant coke charging rate during the test. Scrap charged was drop broken machinery ranging from 1 in. to 4 in. section thickness. It was found that it took about 100 lb more coke to maintain the same tapping temperature with the heavy scrap than with the light.

Activities of the Gray Iron Division were concluded with the roundtable luncheon at which H. A. Laforet, chief metallurgist, Pontiac Motor Co., Pontiac, Mich., and F. J. Webbere, research staff, General Motors Corp., Detroit, described **Duplexing Pays at Pontiac Foundry.**

The presentation, made by Mr. Laforet, described the company's experience in the transition from conventional cupola practice to a duplexing operation. Advantages of the change are uniformity of metal temperature and high quality. Productivity also has been increased. The operation has resulted in a cost saving of from 75 cents to $1 a ton of metal cast.

FOUNDRY MANAGEMENT

TWO INTERESTING discussions featured the management development luncheon program. One presented practical foundry experience in creating the climate for management, and the other was an inspirational type of presentation on getting the most out of yourself. The latter was given by R. Monsalvatge, Dayton, Ohio.

Creating a Climate for Management Development—R. B. Parker, American Brake Shoe Co., New York. Given a little time, any intelligent man can acquire an adequate knowledge of procedures and techniques of business and finance. What he can't acquire are the intangibles — creativity, imagination, judgment, integrity, and an analytical mind. These are key attributes of leadership.

Careful selection of the best candidates is the indispensable first step in any good management development program. The next step is to train them to use their assets to best advantage. Training must be continuous, year in and year out.

The speaker's company attempts to do this by creating an atmosphere in which it is right to challenge an established policy to find out why it was adopted and to fight the boss when the individual thinks he is right, by spelling out the company aims and the obstacles in the way of their achievement, and by inviting potential bosses to discuss problems not directly related to their own jobs. These steps imbue the men with the feeling that they really are a part of the management team.

The second important step is to broaden the experience of the potential executive by giving him more responsibility. This can be done by moving him from job to job to widen his experience and give him an opportunity to see how problems are handled in departments other than his own.

The most important step in management development is letting the potential executives put their ideas into practice. This means giving freedom to plan, to venture along untried paths, freedom from interference, freedom to take risks and, most of all, freedom to fail. Unless a man is free to go ahead with

his ideas despite the risk of failing, it is not possible to be sure of his potential as an executive. Few jobs are more important for top management today than to find and develop men with the capacity for reaching out.

The speaker's company has learned from experience that a man with exceptional ability in one area is very likely to have outstanding abilities in other areas; also that it is a mistake to place more emphasis on a man's formal experience than on his qualities as a man. Finally, the company has discovered that the reaching out process not only stimulates a degree of teamwork not possible under other conditions, but also produces a continuous flow of interdepartmental ideas, real work satisfaction, and deep company loyalties.

In other words, it has been found unwise to create a group of specialists functioning under the domination of a single individual. The days of management dictatorship are gone. Today's top executives must be leaders, not autocrats. Too many foundries, it would seem, tend to be top down, one-man operations. But management is too complex an operation today for any one man to have all the answers, to spark all the ideas.

CORE and MOLDING SAND

MOST EXTENSIVE of the technical sessions held during the AFS Congress was the program sponsored by the Sand Division. In addition to a dinner meeting and a shop course, separate sessions were devoted to the CO_2 process, molding materials for steel castings, packing characteristics of foundry sands, effect of heat on properties of molding sand, study of properties of green molding sand, shell molding, and olivine aggregate.

Investigation of the Hardening of Sodium Silicate Bonded Sand by C. E. Wulff, University of Wisconsin, Madison, Wis. Hardening methods studied included the carbon dioxide, water evaporation, and thermal processes. Carbon dioxide's chief merit is its ability to harden the sand mixture rapidly. Most hardening of sodium silicate sand cores is a combination of CO_2 hardening and evaporation hardening, the former giving the initial set and evaporation producing additional strength. Just enough gassing to make a core that can be handled and then hardened by evaporation appears best from an economic standpoint. Long CO_2 gassing is of no advantage.

Strength developed by thermal hardening depends on the temperature employed; in tests the maximum strength was developed at about 300° F, with further increases in temperature producing lower strengths. Thermal hardening produces high strengths at moderate binder percentages.

Room temperature deterioration of cores apparently is caused by fracturing of binder film through evaporation of moisture or prolonged gassing, or by softening of binder film from pickup of moisture from the atmosphere.

Sodium Silicates for the CO_2 Process by E. A. Lange and R. E. Morey, Naval Research Laboratory, Washington. Presented by Mr. Morey. The rate at which strength develops with CO_2 depends on the SiO_2-Na_2O ratio of the sodium silicate; and the maximum strength developed—as high as 500 psi—depends on the SiO_2-H_2O ratio of the sodium silicate.

Drying ungassed sand mixtures will produce strengths in excess of 2000 psi, but the dry strength of sand which has been gassed with CO_2 depends on the composition of the sodium silicate and the gassing time; dry strength can be less than the gassed strength. The amount of CO_2 necessary to develop maximum gassed strength is that required to increase the SiO_2-Na_2O ratio of the sodium silicate to 4. At low CO_2 flow rates, however, the sodium silicate will absorb an amount of CO_2 equivalent to 1.0 to 1.5 times the amount of Na_2O present. Efficiency of the CO_2 gassing process can be greatly increased by diluting the CO_2 with air.

CO_2 Core Experience in a Malleable Foundry by George Nestor Jr., National Malleable & Steel Castings Co., Cleveland. About 30 per cent of the cores used at this foundry are made by carbon dioxide hardening. Its principal advantages are economy, speed of production, and savings on floor space. Many different sand mixes were tested before adoption of one which includes 450 lb lake sand, 150 lb bank sand, 6 lb seacoal, 12 lb iron oxide, 19½ lb sodium silicate, 4 lb 13 oz molasses and 12 oz of a release agent made up of 18 parts fuel oil and 1 part oleic acid. Selection of the proper grade of molasses was found important; one having an ash content of less than 2 per cent is preferred.

Mixing cycle is 1 minute for dry ingredients, 1 minute after sodium silicate addition, 1 minute after molasses addition and 1 minute after the release addition. Gas consumption ranges from 50 to 70 lb per ton of cores, varying with core size.

A Literature Review of Metal Penetration by A. E. Murton and S. L. Gertsman, Dept. of Mines & Technical Surveys, Ottawa. Presented by Mr. Gertsman. Intended to prevent duplicated effort, this survey covers literature on penetration of metal (particularly steel) into foundry molds and cores.

In an early investigation, John Caine concluded that the major cause of penetration is mechanical entry of metal into large sand voids caused by overly coarse sand, soft ramming, or sand fusion. These conclusions still seem valid.

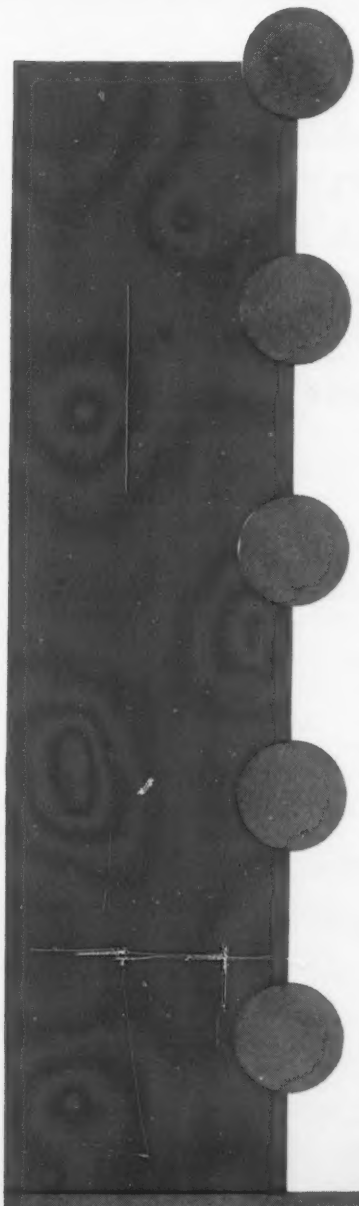
T. P. Hoar and D. V. Atterton found that the surface tension of metal acts to prevent metal from entering the sand and that a positive pressure always is required to produce penetration. Viscous slag washes high in silica prevented penetration in their tests. They also advocated close attention to ramming and molding sand to produce as uniformly rammed molds as possible.

Gertsman and Murton discovered that increasing the metal head without increasing the volume of metal passing the core increased penetration. Both higher temperatures and higher pressures increased penetration, with pressure being the more important factor within the ranges used in foundry practice. Washes alleviated penetration in castings up to 30 in. high, but results were not consistent.

Holger Petterson theorized that pressure of penetrating metal expands voids, allowing the metal to penetrate farther, but the evidence in his paper does not support his theory very well.

Most of the points brought in the review are not inconsistent with good foundry practice. With all the work done on the mechanism of metal penetration, the absolute

60 CYCLE INDUCTION MELTING



A famous metallurgist once wrote: "50% of all rejects can be traced to faulty melting and pouring." When molten metal is overheated, important alloy ingredients are lost by burning. Castings or billets may be porous from combustion gases absorbed by the molten metal. Frequently, unwanted alloy ingredients are picked up from the containers used in melting. If the temperature of molten metal flowing into a mold strays from the optimum, defective castings will result. In a quiet melt alloy ingredients may not dissolve properly, and the metal cast will not meet specifications. Finally, there is the problem of nonmetallics suspended in the melt which cause occlusions and other difficulties in the end product.

60 CYCLE INDUCTION MELTING, properly applied, is probably the biggest single step that can be taken to overcome these traditional melting problems. The method is unique in its combination of two factors: Heat is generated only in the molten metal, and the entire melt is stirred by electromagnetic pressure. Furthermore, high melting rates can be concentrated in a small space. —No part of the furnace is hotter than the metal. Combustion gases are absent and controlled atmospheres can be used. The container is constructed of refractories inert to the molten metal. Temperature control of unprecedented precision is inherent in the method. Electromagnetic stirring assures complete dissolving of all ingredients and a uniform alloy. Suspended nonmetallics are deposited in the electromagnetic pressure area.

These are basic reasons why 60 CYCLE INDUCTION MELTING has had such a spectacular growth in the postwar period. Modern plants require high production rates with controlled quality, yet can assign only a minimum of skilled labor to each operation. 60 CYCLE INDUCTION MELTING minimizes hard labor in melting. It enables process control to substantially decrease the effect of human error. Cost reductions are reflected throughout each step of fabrication of a casting or billet to its end use.

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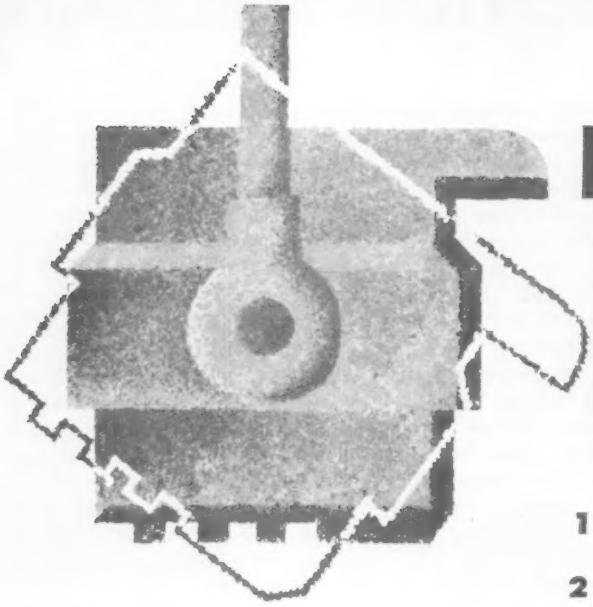

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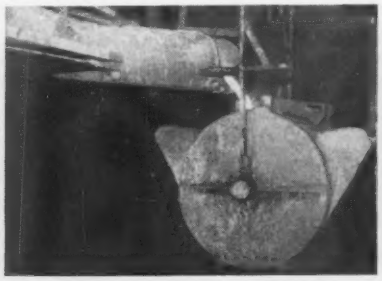

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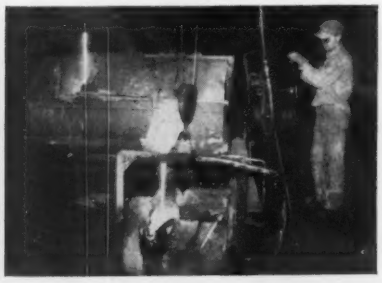

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remedy still eludes investigators.

Mold Surface Behavior by Dan Roberts, Oil City Iron Works, Corsicana, Tex., and E. E. Woodliff, Foundry Sand Service Engineering Co., Detroit. Presented by Mr. Woodliff. A simple, inexpensive, portable instrument which gives high duplication of test results was designed by Oil City Iron Works to test molding and core sand expansion, and a test procedure was developed for use with this device. Most of the tests made were with gray iron, but several also were made with steel. A method of interpretation of test data enabled the authors to predict sand behavior in molds.

These tests indicate that it is possible to predetermine the expansion characteristics of a sand by control over the factors contributing to its expansion. These factors include the following: Type of sand grain, true clay content, distribution of grains, fines content, type and content of combustibles, pouring temperature, pouring rate, and rammed density or hardness.

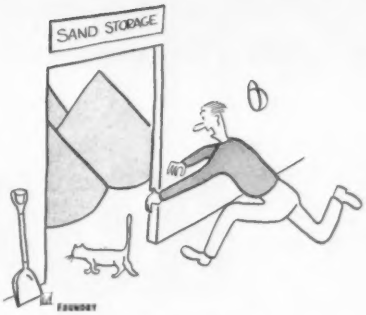
Sintered Alumina Molds for Investment Casting of Steel by B. Bovarnick and F. C. Quigley, Watertown Arsenal, Watertown, Mass. Presented by Mr. Quigley. The authors investigated development of low-cost, thin-walled molds for investment casting. These molds required high strength, ready sintering, and they had to withstand temperatures over 3000° F. Rapid melt-out of wax patterns was important to counteract wax expansion and subsequent danger of mold cracking. Basic requirements were refractoriness and low cost. The possibilities considered were graphite, magnesia, and alumina.

Graphite could not be used, and magnesia was eliminated because its formulation requires alcohol, which is expensive and dangerous. Alumina, which is readily available, can be used, and requires water. It was the material selected.

As worked out, actual mold preparation requires about five minutes —one minute for each of five coats —exclusive of drying time. Coarse alumina is sprinkled on slips between coats.

Molds have enough strength to be poured without backup. Castings show no evidence of mold-metal reaction, and results indicate that the molds produce equal or better castings than conventional methods in two-thirds the time—mostly in time required for runout and firing, thus saving on that expense.

Castings have good finish and



"Oh, no you don't!"

reproducibility, and the molds are economically competitive with other investment casting methods. Size of castings produced in the alumina molds was limited by the patterns available. Largest casting to date weighed 3½ to 4 lb.

Third sand session was devoted to a discussion of packing characteristics. **The Theoretical Concepts of the Packing of Small Particles** by J. B. Caine, Cincinnati and C. E. McQuiston, Advance Foundry Co., Dayton, Ohio, discussed investigations of Furnas and Wise which indicate that packing is independent of grain diameters. In terms of foundry sand, this circumstance means that only distribution is a necessary prerequisite for maximum packing, and it could be obtained with equal ease for either coarse or fine sands so long as their distributions conform to the theoretical one.

Density of Sand Grain Fractions of the AFS Sieve Analysis by R. W. Heine, University of Wisconsin, Madison, Wis., and T. W. Seaton, American Silica Sand Co. Inc., Ottawa, Ill. Presented by Mr. Heine. Results obtained in a study of five different sands were described. Some conclusions were that density of sieve fractions decreases as fineness increases regardless of compaction method when high-purity silica sand grains are used. Iron oxide in sands increases density beyond that for comparable fractions of pure sands.

Relationship between compacting energy and density remains the same regardless of size and shape of sand grains. Less applied jolting energy achieved maximum density as fineness of fractions increased. After maximum density was reached, additional application of energy resulted in a reduction of density of the mass.

L. J. Pedicini, Congress Die Casting Division, Tann Corp., Detroit, in **Packing Characteristics of Typical Foundry Sands** presented data on densities of 11 types of sand. They ranged from two-screen to five-screen distribution and from 34.4 to 160.8 AFS grain fineness. Densities were ascertained by ramming, and by vibrating dry and moist sands. Densities ranged from 56.2 to 66.7 per cent. Highest densities were obtained under vibrating packing.

Effect of heat on molding sand properties was discussed at the fourth session. In **Investigations on the Effect of Heat on the Bonding Properties of Various Bentonites** by Franz Hofmann, George Fischer Ltd., Schaffhausen, Switzerland, it was pointed out that European bentonites are calcium-base similar to southern bentonites in this country. They were converted to sodium-base by suitable additions of sodium or potassium carbonate. Some were slow and others rapid in conversion. Five per cent additions of the converted materials were made to sand, mixed, and then heated at various temperatures up to 800° C. Moisture was added to the treated sands, and then they were subjected to differential thermal analysis.

Those calcium-base bentonites which provided a rapid ion exchange were found to have properties approaching the natural western sodium-base type bentonites.

Problem of Hot Molding Sands by R. W. Heine, University of Wisconsin, Madison, Wis., and E. H. King and J. S. Schumacher, Hill & Griffith Co., Cincinnati. Presented by Mr. Heine. Hot molding sand must be cooled before starting effective mulling to develop suitable physical properties. When that point is reached the sand must be mulled for a sufficient period to provide the desired dry and green strengths.

Preferably the sand should be cooled below 120° F, and the time required will depend on ingoing sand temperature, batch size, type of muller, etc. During cooling, moisture decreases, and sufficient must be added at the beginning to result in a suitable amount at the end. Criterion of adequate mulling time should be dry compressive strength or combination of dry and green strength rather than green strength.

Gas Pressures in Green Sand Molds by C. T. Marek, Purdue University, Lafayette, Ind., and C. B. Ward, Wright-Patterson Air Force Base, Dayton, Ohio. Presented by Mr. Ward. Changes in permeability up to an optimum of 5.5 per cent moisture tend to counteract the

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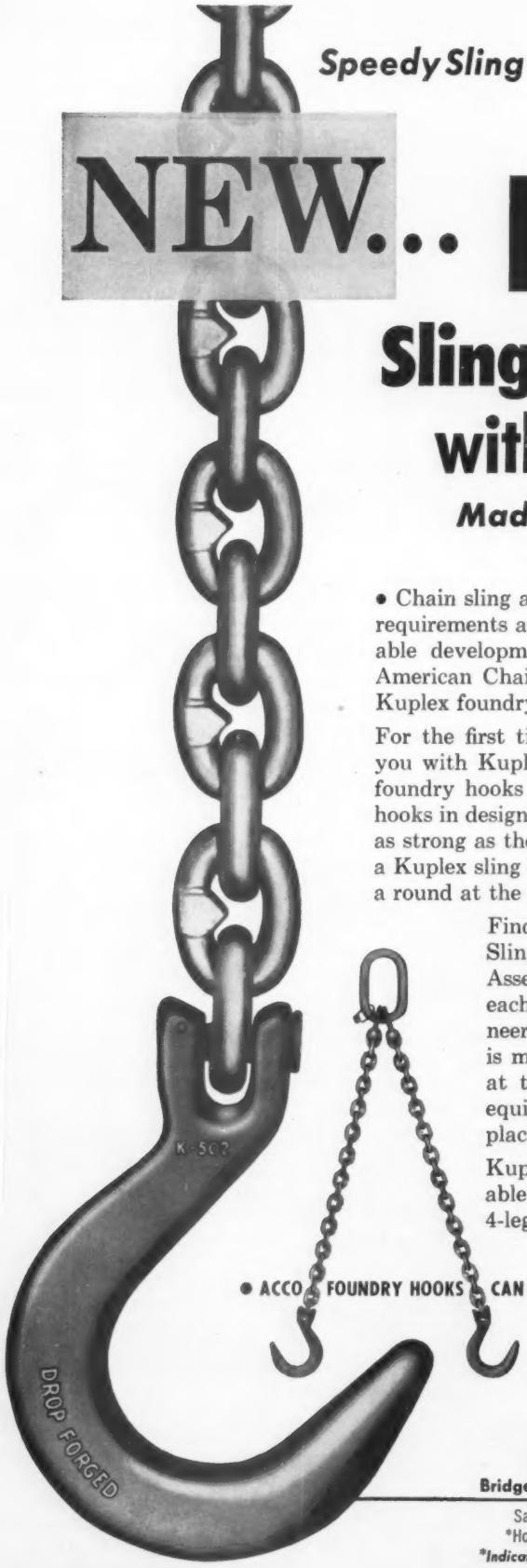

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Hot Deformation of Molding Sand by H. W. Dietert, Harry W. Dietert Co., Detroit and T. E. Barlow, Eastern Clay Products Department, International Minerals & Chemicals Corp., Chicago. Presented by Mr. Dietert. Use of an improved expression for hot deformation as a rate per psi rather than ultimate deformation was suggested. Formula for hot deformation rate is 1000 times hot deformation at chosen load divided by the chosen load. Chosen load is any compressive strength reading less than one-half the rupture load. The greater the hot deformation rate, the safer the sand is from possible mold wall fracture. Hot deformation rate at 2000° F may be increased by additions of cellulose materials, cereal binders, seacoal and pitch; also by working the sand on the dry side of temper, working sands with ample clay substance, and limiting fines.

Correlation of Green Strength, Dry Strength and Mold Hardness of Molding Sands by R. W. Heine, University of Wisconsin, and E. H. King and J. S. Schumacher, Hill & Griffith Co., Cincinnati. Presented by Mr. Heine. Study of a wide range of foundry sands at different moisture levels, ramming levels, and clay bonds resulted in preparation of a chart depicting the combinations of green and dry strengths which may be expected, as well as the flowability and deformation.

Industrial Applications of Olivine Aggregate by G. S. Schaller and W. A. Snyder, University of Washington, Seattle, presented by the former, described expanding uses of that molding material in producing ferrous and nonferrous castings. Used essentially as a facing material, olivine eliminates expansion and other problems attributable to sand in certain types of castings. Good results have been obtained with green and dry sand practice and with the CO_2 process. In shell molding a mixture of 80 per cent olivine, 20 per cent silica sand, and 6 per cent resin is being used successfully.

Evaluation of Shell Molding Process Capability by W. C. Truckenmiller, C. R. Baker and G. H. Bascom, Albion Malleable Iron Co., Albion, Mich. Presented by Mr. Baker. Procedures followed in developing patterns, practices and control methods for an automatic transmission casting and a split differential case casting, both of which had to meet close dimensional tolerances, were described. Information on two types of shell cores for other applications also was included. In the case of the transmission part, closer dimensional tolerances obtained reduced metal removal, increased ease of static and dynamic balancing, and aided automatic machining operations.

With the differential casings, relationship between process capability and customer tolerances was provided as well as an exacting approach to establishment of critical pattern dimensions in a single corrective step. Studies of shell coremaking equipment showed process capability and indicated numerical values to improve dimensional accuracy.

Report of Sand Division Committee 8-N by N. Sheptak, Dow Chemical Co., Midland, Mich., on a **Shell Molding Survey** indicated weights of castings produced range from 0.02 to 151 lb, with the average under 10 lb. Gray iron patterns are favored and the dump box method is the most widespread method of making molds.

Dimensional tolerances range from 0.001 to 0.025 in. per in. except across the parting line where they vary from 0.003 to 0.125 in. per in. Subangular sands with three and four-screen distribution and AFS grain fineness from 80 to 110 are being used. Advantages of shell molding include better surface appearance, closer dimensional tolerances, lower costs, and increased production. Difficulties encountered include mold cracking and surface defects.

Another committee report, on **High Temperature Properties of Shell Molds**, presented by R. A. Rabe, Foundry Process Development Section, General Motors Corp., Detroit, indicated that cracking of shells is caused by expansion, and occurs in the first 15 or 16 seconds. Use of bank sand appears to reduce expansion difficulties. Surface defects often are caused by the gating system, and a suggested remedy is to employ a smaller gate.

FUNDAMENTAL PAPERS

TWO SESSIONS were devoted to subjects concerned with basic research rather than with current foundry operating practice. The eight papers presented applied to both ferrous and nonferrous metals.

Ductile High-Strength Titanium Castings by Induction Melting by J. Zotos, P. J. Ahearn, and H. M. Green, Watertown Arsenal, Watertown, Mass. Presented by Mr. Zotos. A modified induction melting technique was employed to remelt titanium alloy scrap and process it into castings. These castings had mechanical properties approaching the specification for forged titanium. Induction stirring of the melting furnace produces metal of uniform composition and temperature. Further experiments are being directed toward reducing interstitial content, investigating mold materials, and improving heat treatments.

Effect of Pressure During Solidification on Microporosity in Aluminum Alloys by S. Z. Uram, M. C. Flemings, and H. F. Taylor, Massachusetts Institute of Technology. Presented by Mr. Uram. Aluminum alloys 356 and 195 were solidified in a chamber under pressures varying from atmospheric (15 psi) to 16.7 times atmospheric (250 psi). Pressures greater than atmospheric resulted in a substantial reduction of microporosity in sand cast specimens. The test castings were adequately risered, and the alloys thoroughly degassed.

Effect of the pressure indicates that the microporosity observed was caused primarily by precipitation of minute amounts of gas during solidification. The reduction in microporosity as a result of the applied pressure was not accompanied by an appreciable increase in mechanical properties of the solution treated and aged test bars cut from the castings.

Fundamental Studies on Effects of Solution Treatment, Iron Content, and Chilling of Sand Cast Aluminum-Copper Alloys by E. M. Passmore, Avco Mfg. Corp., and M. C. Flemings and H. F. Taylor, Massachusetts Institute of Technology. Presented by Mr. Flemings. These studies show that increasing solution treating temperatures (and times) above those normally employed improves the mechanical properties of aluminum-copper alloys (3.7 to 5.8 per cent Cu). Mechanical properties of a slowly

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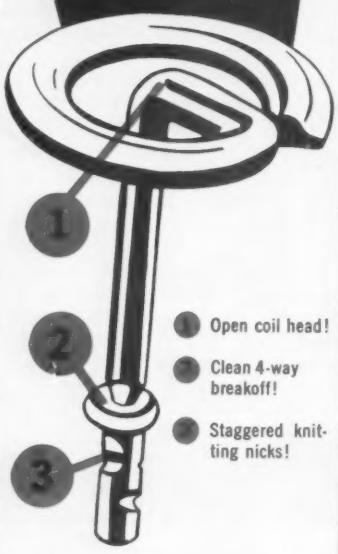

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Circle 661 on Page 51

cooled aluminum-copper (4.25 per cent Cu) alloy were 42,000 psi ultimate strength, 27,000 psi yield strength, 7 per cent elongation after heat treating one day at 960° F. Using a step heating schedule with final solution temperature 1010° F, ultimate strength increased to 47,000 psi, yield strength was unchanged, and elongation was raised to 13 per cent.

Heat treating a 4.25 per cent copper alloy chilled section at temperatures greater than those normally employed does not appreciably improve mechanical properties. Iron as an impurity lowers mechanical properties of aluminum-4.5 per cent copper alloy even when present in amounts less than 0.24 per cent. Iron does not affect mechanical properties of a chilled section of aluminum-copper alloy as much as it does those of a slowly cooled section.

Solidification and Risering of Gray Iron Castings by C. M. Adams, M. C. Flemings, and H. F. Taylor, Massachusetts Institute of Technology. Conclusions of an 8-year study were presented. Natural volume decrease of gray iron during cooling depends on metal chemistry. Size and location of voids is influenced by chemistry and movement of casting surface. Latter factors include size and shape of casting, atmospheric and ferrostatic pressure, molding material, and size, shape, location, and thermal treatment of gates and risers.

Effect of Some Gases on the Work of Adhesion between a Novolak and Quartz by D. W. G. White, Department of Mines & Technical Surveys, Ottawa, Canada, and H. F. Taylor, Massachusetts Institute of Technology, described an investigation on effect of water vapor, nitrogen, ammonia, and oxygen on bond strength of phenolic resin. It was found that oxygen had the most potent and deleterious effect which could not be determined in terms of the surface energy measurements employed. Water vapor and ammonia increased surface tension and work of adhesion. Nitrogen decreased surface tension and work of adhesion.

Effect of Temperature and Atmosphere on Iron-Silica Interface Reaction by G. A. Colligan, R. A. Flinn and L. H. VanVlack, University of Michigan, Ann Arbor, Mich. Using compacts of pure iron and silica sand heated to different elevated temperatures in atmospheres of different degrees of oxidation, the mechanism of mold attack was found to be that iron oxidized at the mold surface forms a separate oxide liquid which wets the silica sand. This liquid phase penetrates into the pores of the mold. Silica is soluble in this liquid oxide up to about 50 per cent by weight. Solution of the silica enlarges pores in the sand, permitting molten iron penetration although the iron does not wet the sand.

Other papers included a presentation by E. B. Evans, Case Institute of Technology, Cleveland, of **Resume of: Formation of Ferrite and Pearlite in Cast Iron and Formation of Undercooled Graphite in Cast Iron** by G. Ohira and K. Ikawa, Tohoku University, Sendai, Japan, and **Reduction of Silica in Large Shell Molds** by L. H. Van Vlack, R. G. Wells, and W. B. Pierce, University of Michigan, Ann Arbor, Mich.

In this latter investigation, it was found that at the temperatures of molten iron silicon monoxide gas was formed by reduction of silica sand at the interface. During the solidification of the iron the gaseous monoxide formed small holes in the surface in which it condensed as small slag-like particles. To minimize that occurrence, the authors suggested keeping the superheat of the iron at the minimum as well as avoiding presence of aluminum, zirconium, and titanium in the iron.

(*To be concluded next month*)

More than 1000 Attend Central Foundry Division Conferences

More than 1050 guests attended the Casting Design Conference series of Central Foundry Div., General Motors Corp., from its inauguration on Dec. 7, 1957, to the 13th conference on May 27. Conceived only as a customer service program, the conferences are reported to have become "the most creative selling tool in the experience of the division."

Visitors attending the one-day conferences hear a presentation of facts about castings, their applications, casting processes, and ways to design castings. They are shown examples of how modern foundry tools have improved foundry products and are invited to view operations of the division's Saginaw Malleable Iron Plant.

Originally aimed at design engineers, the conferences also have attracted company presidents, vice presidents, general managers, plant managers, and other management personnel. Current plans call for a resumption of the series next fall.

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Circle 662 on Page 51

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Circle 663 on Page 51

Obituary

ALEXANDER W. PIRRIE, 52, vice president of manufacturing, American Standard Products (Canada) Ltd., Toronto, Ont., subsidiary of American Radiator & Standard Sanitary Corp., New York, and a national director of the AFS, died May 22 while attending the AFS Congress in Cleveland. Mr. Pirrie was associated with various Montreal foundries until 1937 when he joined Gurney Foundry Co., there and subsequently became assistant plant superintendent. Following wartime service with Electric Steels Ltd., Three Rivers, Que., he returned to Gurney at Toronto. When the plant was acquired by Standard Sanitary & Dominion Radiator Ltd. in 1950 he became manager of the Gurney plant and of the Dominion Radiator plant. In 1956 the name was changed to American Standard Products (Canada) Ltd. Mr. Pirrie is a former chairman of the Ontario Chapter of the AFS.

ALEXANDER W. PIRRIE

William H. Eisenman, 73, secretary and a founder member of American Society for Metals, Cleveland, died May 30, while on a vacation at his Palm Springs, Calif., home. He was educated at Kenyon College, Stanford University, Morningside College, and Ohio State University, and for a period was engaged in high school and college educational activities. In 1918 Mr. Eisenman became national secretary of American Society for Steel Treating, forerunner of the ASM. In addition to his duties as secretary of the ASM, he was managing director of the National Metal Show for many years. In 1956 he received the ASM Gold Medal for distinguished contribution to the metallurgical industry.

James E. Eppley, former superintendent, Kinney Iron Works, Los Angeles, died May 5. After learning the molder's trade at Duncan Foundry & Machine Works, Alton, Ill., he was associated with foundries in Missouri, Iowa, Illinois, and Wisconsin. He became superintendent of Kinney Iron Works in 1936. Mr. Eppley was chairman of the Southern California Chapter of the AFS in 1940.

Joseph B. Barker, 81, retired president of the former James Barker Machine & Foundry Co., Philadelphia, died May 21. A graduate of University of Pennsylvania, Mr. Barker was a former national president of the American Society of Mechanical Engineers.

Samuel T. Rice, 73, who at one time owned the former American Foundry Co., Hamilton, Ohio, died May 24 in Miami Beach, Fla., where he had lived for the last six years.

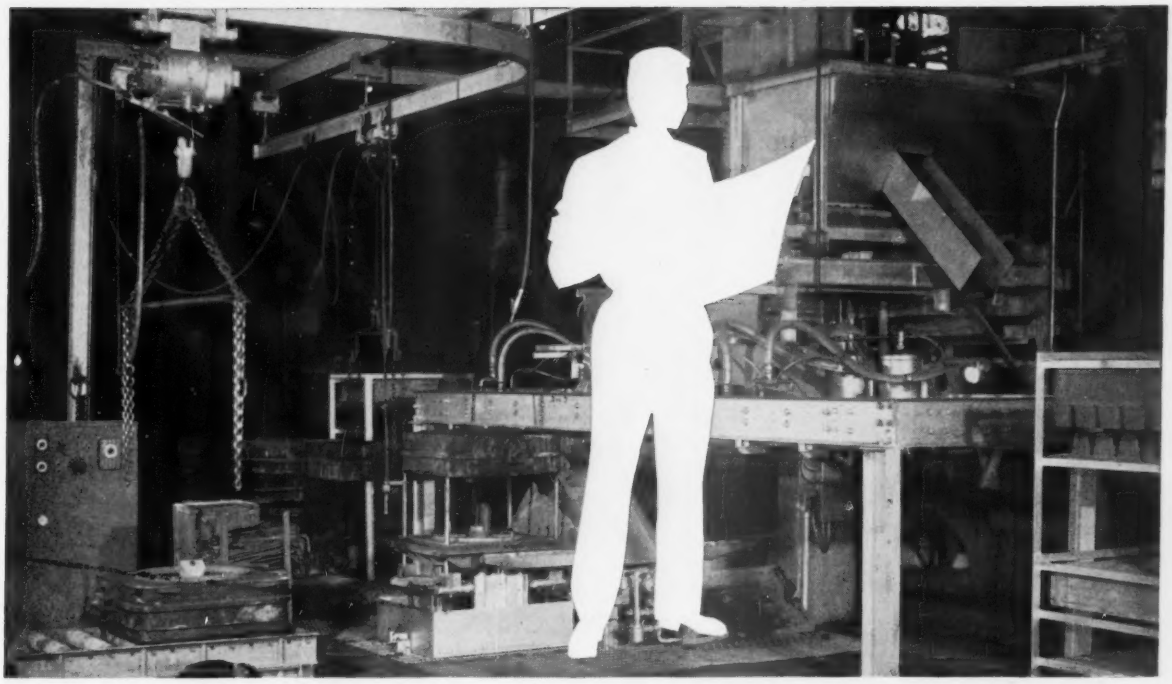
Martin F. Pendergast, 66, who retired in 1953 as erection and service enginer, Whiting Corp., Harvey, Ill., after 29 years with the company, died Jan. 30 in Ballston Spa, Saratoga County, N. Y.

Harry B. Stillman, 55, one of the founders of Stillman Foundry Co., Grand Rapids, Mich., and owner of Bud Stillman Associates, manufacturers agents, Birmingham, Mich., died May 7.

Edward N. Wheeler, 48, metallurgist, Belle City Malleable Iron Co., and its subsidiary, Racine Steel Castings Co., both of Racine, Wis., died May 27, after 30 years of service.

Daniel E. MacLean, 63, vice president, Lava Crucible-Refractories Co., Pittsburgh, died April 26. He had been with the company since 1920.

Albert H. Noyes, 79, chairman of the board and former president, Hills-McCanna Co., Chicago, died April 24 in Florence, Italy.



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Circle 664 on Page 51

Literature for Foundrymen

Shell Molding Guide

An extensively revised edition of a guide originally published in 1953, this 32-page booklet deals with the merits of shell molding, methods, materials, equipment, and costs. It also describes causes of casting defects and offers remedies.—Durez Plastics Div., Hooker Chemical Co., North Tonawanda, N. Y.

For More Details Circle No. 475—Page 193

Protective Apparel

Catalog illustrates every type of clothing required by the heat, abra-

sive, and chemical industries.—Wheeler Protective Apparel Inc., 224 W. Huron St., Chicago 10, Ill.

For More Details Circle No. 476—Page 193

Colloidal Graphite

Booklet, "The ABCs of Colloidal Dispersions," provides the answers to questions asked about the many industrial uses for these products.—Acheson Colloids Co., Port Huron, Mich.

For More Details Circle No. 477—Page 193

Sand Coater

Bulletin SP 5000 gives specifications and features of "Unipak-Coater" for coating sands for shell molds and cores of all shapes, sizes, and uses. Automatic or manual operation is provided.—Sutter Products Co., Hadley and Grant Sts., Holly, Mich.

For More Details Circle No. 478—Page 193

Mold Dies

Facilities and products of this designer and builder of die casting dies, permanent mold dies, automated molding machines, and piston cores for production of nonferrous castings are detailed in 16-page bulletin.—Permanent Mold Die Co., 2275 East Nine Mile Rd., Hazel Park, Mich.

For More Details Circle No. 479—Page 193

Tempering Furnaces

Bulletin DL-58 explains the straight-through feature and automatic loading equipment for in-line operation of tempering furnaces. Cross-sectional drawings and specifications are included.—**Ipsen Industries Inc.**, 715 S. Main St., Rockford, Ill.

For More Details Circle No. 480—Page 193

Die Steels

Essential characteristics of die steels for pressure diecasting process with discussion on heat treatment are presented in a 16-page booklet. Recommendations on types of tool steels and heat treatment for application in diecasting light alloys, copper-base, lead or tin, and zinc-base alloys are given in tabular form.—**Crucible Steel Co. of America**, Oliver Bldg., Pittsburgh 22, Pa.

For More Details Circle No. 481—Page 193

Sand Reclamation

Operators' experiences and operating principles of pneumatic scrubber for reclamation of foundry sands in capacities of 1 to 10 tons per hour are described in bulletin.—National Engineering Co., 549 West Washington Blvd., Chicago 6, Ill.

For More Details Circle No. 482—Page 193

Hydraulic Control

Details of new hydraulic flow control valve used to regulate the piston speeds of hydraulic cylinders and other hydraulically powered devices are given in Bulletin 275.—**Hanna Engineering Works**, 1765 Elston Ave., Chicago 22, Ill.

For More Details Circle No. 483—Page 193

Cobalt-Base Alloys

Two 16-page booklets describe properties of Haynes Stellite alloy No. 21 and Haynes Stellite alloy No. 31. Both are cobalt-base high-temperature alloys used mainly in the form of investment castings.—Haynes Stellite Co., Div. of Union Carbide Corp., 30-20 Thomson Ave., Long Island City 1, N.Y.

For More Details Circle No. 484—Page 193

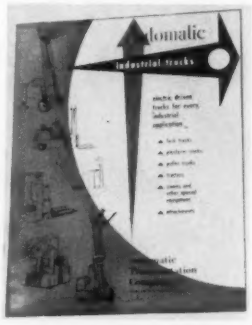
Sand Extruder-Blower

Leaflet cites advantages and specifications of sand extruder-blower for production of medium and large cores. Can be controlled manually or automatically.—Tabor Mfg. Co., Lansdale, Pa.

For More Details Circle No. 485—Page 193

Truck Selector

Guide shows how to set up material handing systems in relation to specific plant layouts and kinds of products produced. Includes de-



scription of 20 basic industrial truck types and specifications for 100 different models. — Automatic Transportation Co., 149 West 87th St., Chicago 20, Ill.

For More Details Circle No. 486—Page 193

Shell Processing

Variety of equipment adapted to the shell molding process is described in Bulletin 6000. Includes shell molding machines, blowers, and sand preparation units.—Beardsley & Piper, 2424 North Cicero Ave., Chicago 39, Ill.

For More Details Circle No. 487—Page 193

Refractory Castables

Proper applications for 15 specialized castable refractory cements, information on anchoring castables, an estimating chart, mixing and placing instructions, and suggestions for pneumatic placement of cast-

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ables are detailed in 24-page booklet.—Mexico Refractories Co., Mexico, Mo.

For More Details Circle No. 488—Page 193

Shell Coremaking

Features of a low-cost machine for making intricate, small cores in four gang boxes at the rate of ten per minute—depending on thickness desired—and cores up to 9-in. diameter, 12-in. length, or 6-in. diam by 18-in. length, at the rate of one per minute are detailed in new bulletin. —Dependable Pattern Works, 1634 Southeast Seventh Ave., Portland 14, Oreg.

For More Details Circle No. 489—Page 193

Epoxy Resins

"Epoxy Resins—Applications and Advantages" is title of illustrated brochure summarizing uses of epoxy compounds in various industries, their selection, and methods of handling.—Marblette Corp., 37-31 30th St., Long Island City 1, N. Y.

For More Details Circle No. 490—Page 193

Water-Cooled Cupolas

Bulletin 149-A illustrates the principles of water-cooling for cupolas which melt directly against the steel shell and provide flexibility of the closely controlled slag. It permits changeover from and to basic, acid, and neutral slag.—Modern Equipment Co., Port Washington, Wis.

For More Details Circle No. 491—Page 193

Shell Sand Coater

Automatic unit for resin coating of sand at a rate of up to 3000 lb per hour is described in Bulletin CS-806. A batch of 3 cu ft is treated in a 5-minute cycle.—C & S Products Co., 18656 Fitzpatrick, Detroit 28, Mich.

For More Details Circle No. 492—Page 193

Bentonite Testing

Four-page bulletin describes bentonite testing, including photos, graphs, testing formulas, technical requirements, and apparatus for the tests.—Soiltest Inc., 4711 W. North Ave., Chicago 39, Ill.

For More Details Circle No. 493—Page 193

Storage Racks

Application and description of roller-equipped rails for construction of live storage units are presented in a 12-page folder. Manufacturer claims improved storage usage, work positioning, order selection, and inventory control for the equipment. — **Rapids-Standard Co. Inc.**, Rapistan Bldg., Grand Rapids, Mich.

For More Details Circle No. 494—Page 193

Hard-Facing Electrodes

Manual provides a guide for the application of hard-facing alloys. Discusses properties of six different types of electrodes for various uses.—Sight Feed Generator Co., West Alexandria, Ohio.

For More Details Circle No. 495—Page 193

Chain Repair Links

Useful data on application of repair links for chains and chain assemblies are given in Bulletin DH-143. Chain size, working load limits in pounds, dimensions and weight per link are listed.—**American Chain Div., American Chain & Cable Co. Inc.**, York, Pa.

For More Details Circle No. 496—Page 193

Shell Core Machine

Machine for fast, economical mass production of a wide variety of hollow cores and shell molds, when mixed types and sizes are blown simultaneously, is described in Bulletin SC-30. Will handle coreboxes from 1 x 5 x 3 in. to 16 x 21 x 9 in. —SPO Inc., 7500 Grand Division Ave., Cleveland 25, Ohio.

For More Details Circle No. 497—Page 193

Overhead Conveyor

New 44-page catalog No. CDA describes overhead conveyor designed for ease of installation, quiet operation, and long life. Provides sufficient information to engineer a Cable-Way conveyor of any size.—American MonoRail Co., Fourth and Franklin, Tipp City, Ohio.

For More Details Circle No. 498—Page 193

Snagging Handbook

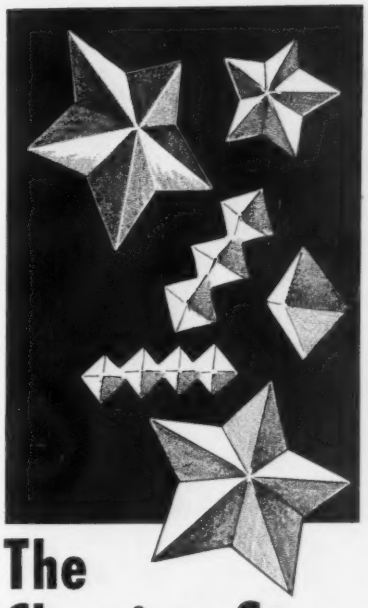
A complete description of the factors involved in snag grinding operations, including operational and cost factors, are discussed in 16-page bulletin.—Peninsular Grinding Wheel Division, 729 Meldrum Ave., Detroit 7, Mich.

For More Details Circle No. 499—Page 193

Vibratory Feeders

Descriptions of various types of feeders for the controlled movement of bulk materials, including specifications and installation views, are given in 32-page bulletin.—Syntron Co., Box 220, Homer City, Pa.

For More Details Circle No. 500—Page 193



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Circle 665 on Page 51

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Ancient Practice"

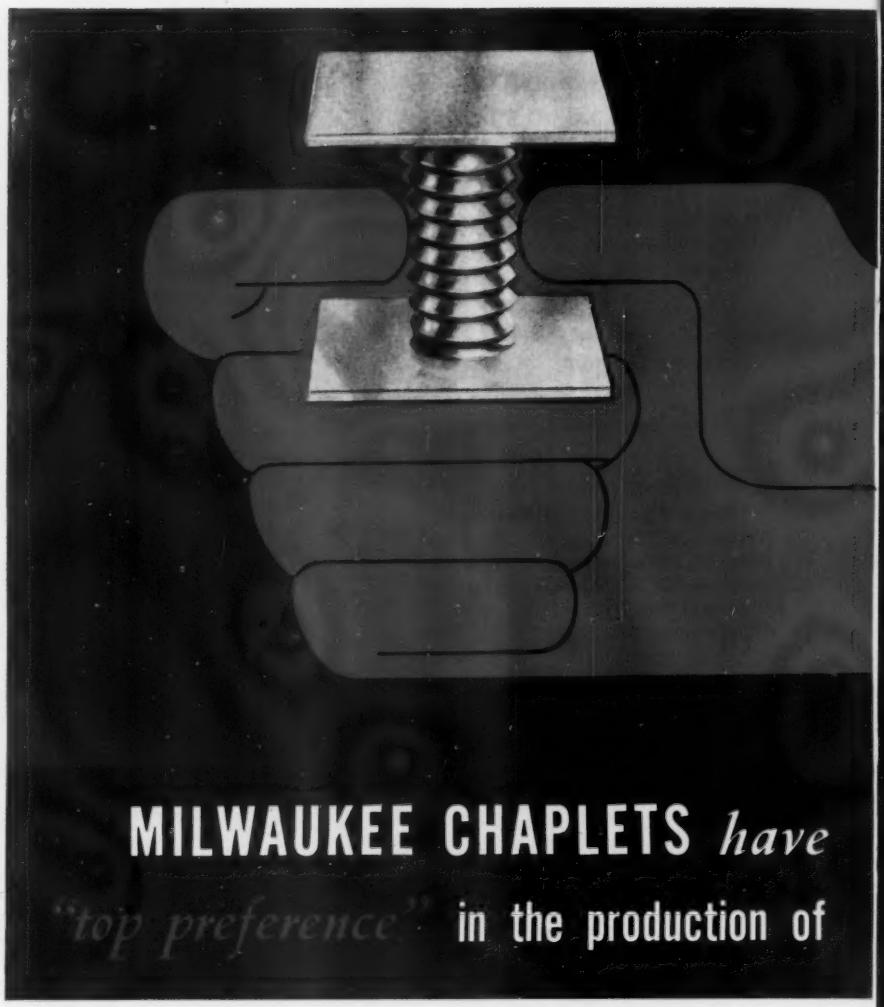
THIS business of making castings in sand molds is both ancient and honorable. We have accumulated evidence that the molder's art existed at least 1000 years before the birth of Christ and that it was a highly skilled technique.

During the last several hundred years, the Bible has exercised a profound influence on the thought and habits of each succeeding generation. As to the historical value of technical data in the Old Testament, there is probably a wide field for speculation. Since this is the world's most quoted book, however, I recently have pored through it in search of "casting" references, of which there are many.

War seems always to have been a stimulant to the inventive impulse, and to technical advancement, and, the Bible reveals, so it was with the ancients and the many countries which enjoyed the temporary triumphs of armed conflict. Technology seemingly rose and fell in keeping with their victories or defeats.

My recent trip to Turkey brought this fact home to me most forcibly. When the Turks were terrorizing Europe and Asia some 300 to 400 years ago, their foundrymen assertedly were producing cannon of ominous proportions. In the subsequent years of a questionable peace and unquestionable decadence, their knowledge of heavy casting disappeared. Only in recent years have they revived a semblance of foundry progress.

During the 16th century in Italy, Benvenuto Cellini produced his masterworks of bronze statuary, probably the most beautiful castings the world has ever seen. He carried most of his secrets to the grave



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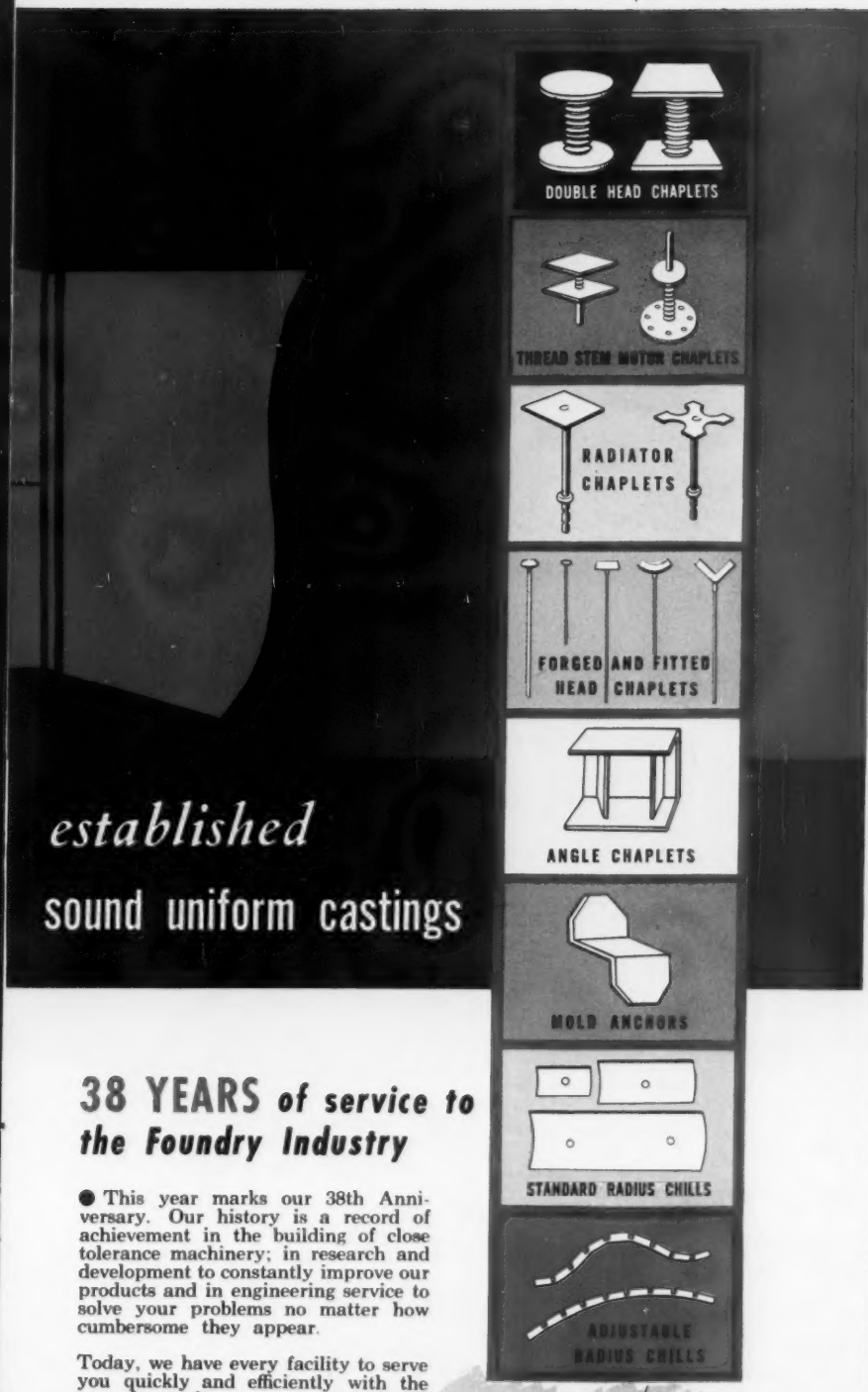

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Today, we have every facility to serve you quickly and efficiently with the very finest chaplets and chills on the market.

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MILWAUKEE 46, WISCONSIN

Circle 666 on Page 51

Yet, even he had sand trouble, as is still clearly evident in his deathless bronze and in at least one of his acknowledgments.

The Transition Period—In our attempt at sand control, we are making the transition from an art to a science, and this step never is achieved without difficulty. In this connection, I am reminded of the shoe industry. Fifty years ago, most leather was bark-tanned by a slow and laborious process, and the best shoes were handmade. The quality of a shoe depended on the secret process of the tanner and the skill of the shoemaker.

In the initial effort of applying science to the business of shoemaking, the quality of the product took a nose-dive. As an apprentice boy I paid $4 (which I could ill afford) for a pair of molder's shoes that lasted less than three months. Today, the average $6 shoe is good for more than a year. The science of shoemaking now excels the art it displaced.

Perpetual Problem

So it is with foundry sand. We always will have trouble with sand, just as we always will have trouble with everything else. But those troubles will diminish as our knowledge of the subject increases—and in due proportion. Wherever men have concentrated their attention on their sand problems, they invariably have succeeded in improving casting quality and production to an amazing degree.

We have innumerable instances of this success. We gradually are developing a science of foundry sand control that is paying off. When we produced what is known to most of us as synthetic (formulated) sand, we took our first definite step in the scientific direction. We had begun to weigh or otherwise more carefully measure our materials and to discriminate in our selection of clays and other ingredients. The word "control" began to have some meaning.

Somewhat to our surprise, we learned that a scant shovel of dry seacoal tossed over ten heaping shovels of damp sand didn't add up to the 10 per cent addition. And our 7-pt core-oil can didn't provide the gallon we thought we were using. Perhaps the scientific approach might be described as being "exceedingly inquisitive," but whatever it is, we need a lot more of it!

The Hard Way—Most of the old-time foundrymen came up the hard way. They had a living to make under tough conditions. Many of

Why Gamble on Blast Cleaning Efficiency?

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CHECK LIST OF BLAST CLEANING EFFICIENCY

IS YOUR BLAST EQUIPMENT ADJUSTED TO GIVE YOU MAXIMUM PRODUCTION BY:

1. Throwing the maximum amount of abrasive at the work?
2. Throwing an abrasive mixture with a full range of sizes, and no contaminants?
3. Throwing all the abrasive upon the work with minimum wear on machine parts?
4. Using the abrasive best suited for your application?

ARE YOU GETTING MAXIMUM CLEANING ECONOMY BY ELIMINATING ABRASIVE LOSSES:

1. Through the separator system?
2. Through the dust collector and ventilation system?
3. Through abrasive carried out with the work?
4. Through cabinet leaks and poor housekeeping?

ARE YOU REDUCING MAINTENANCE COSTS AND PRODUCTION LOSSES BY:

1. Obtaining longest possible life from wear parts?
2. Using preventive maintenance to reduce "down time"?

	Yes	No	Don't Know
IS YOUR BLAST EQUIPMENT ADJUSTED TO GIVE YOU MAXIMUM PRODUCTION BY:			
1. Throwing the maximum amount of abrasive at the work?			
2. Throwing an abrasive mixture with a full range of sizes, and no contaminants?			
3. Throwing all the abrasive upon the work with minimum wear on machine parts?			
4. Using the abrasive best suited for your application?			
ARE YOU GETTING MAXIMUM CLEANING ECONOMY BY ELIMINATING ABRASIVE LOSSES:			
1. Through the separator system?			
2. Through the dust collector and ventilation system?			
3. Through abrasive carried out with the work?			
4. Through cabinet leaks and poor housekeeping?			
ARE YOU REDUCING MAINTENANCE COSTS AND PRODUCTION LOSSES BY:			
1. Obtaining longest possible life from wear parts?			
2. Using preventive maintenance to reduce "down time"?			

If you have to answer "no" or "don't know" to any of these questions, you're gambling with potential profit dollars. The best way to eliminate this gamble and save any profit "waste" is described in Wheelabrator Abrasive Bulletin No. 902D. Write for your copy today.

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them had been denied even a common school education. They were limited to the tools, methods, and materials which they had inherited, and even with these they were surprisingly successful. Some, of course, resented progress in any form, but most of these fortunately have disappeared from the foundry scene.

The more ambitious foundryman always has sought a better way, and to him must go much of the credit for our advancing economy. As our men of academic bent began to analyze not only our sand, but all additives and methods used in connection with it, this knowledge became common property, and even the fellow with little education came in for a share of the benefits.

Perhaps he is like the man who milked his neighbor's cow through the fence, but at any rate he is getting some of the milk. Most of us are not scientists, yet we all reap the benefits of science and certainly should contribute in any way we can toward the extension of scientific inquiry. The laboratory boy in his white smock is truly a partner of the begrimed foundryman who may not know a test tube from a bunsen burner. Together, their future progress should prove magnificent!

Success and Failure—At present, I am concerned mainly with the behavior of foundry sand, its history, its current status, and the possibilities which I believe it possesses. Those of us who have worked with it over the years have enjoyed our moments of success, but we also have suffered a considerable amount of sand failure, and at times this failure can prove frustrating indeed.

In such a mood, it is understandable that we should seek a less troublesome method of making castings. We have employed many substitutes for sand, each having something to recommend it, but usually coupled with drawbacks that made it economically impractical. Sand remains the major molding medium. We're going to live with it and develop potentials which are now in the dream stage.

Harry Dietert once said that he wasn't so much concerned with the kind of sand a man was using as he was with what he put into the sand. The list of additives, those which have a beneficial effect on sand properties, is by no means exhausted. We are learning more about them every day. Especially in iron practice, some of the so-called "stabilizers" have shown surprising promise. What tomorrow will bring is anybody's guess!

Pot room in modern aluminum smelter at Isle Maligne, Quebec.

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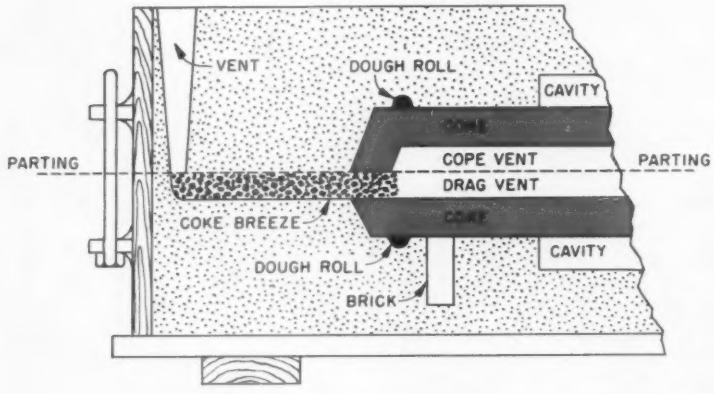
Trouble Shooting

By C. W. AMMEN



Drawing shows how coke breeze is placed in the vent passage in the mold, just under top face of the drag, to bring vent up and out in safe place

Venting Large Cores

Dear Charlie:

When we job catch-as-catch-can, we more than often get into jobs with relatively large cores which require large vents. In many cases we find that the cores fit very poorly into the prints, something which makes for a problem when it comes to preventing the metal from entering the vents and raising havoc, even with the use of a core paste seal or dough roll. This danger also is a problem with ill-fitting tapered or cone prints in the cope half.

In a job we had recently, in which the core was almost completely surrounded by metal, the vent stopped up when metal ran in, and the vents went off like a cannon. On the second try the same thing happened, and metal got through at the core joint or parting. Neither pattern nor corebox was in good condition.

Sincerely,
Sam

Dear Sam:

As long as you are jobbing that way, you are required to work with all types of equipment in various conditions—good, bad, and unfit for molding or coremaking at all.

A lot of emphasis has been placed on making castings as such. It often is said that Joe over there can make any kind of casting thrown at him, but Bill can be given only certain types of castings to make. Now let's look at this statement for what it really is. First, a molder does not make castings. A casting is the end product, the fruit of many people doing many things from cutting sand to lining the ladles. The ultimate in the production of a fine casting results when each individual performs his particular contribution to the overall picture with skill and to the best of his ability.

A molder who can make high-quality molds of a large variety is one who has a sound basic knowledge of molding practices and is making molds with the making of the mold in mind, not the casting. One who is limited as to what type and kind of mold he can make often is concentrating on the casting, not on making the molds.

The statement that a casting can be no better than the pattern equipment used in its production is not necessarily true. Some very fine castings have been and are being made every day from some pretty lousy pattern equipment by skilled molders who know how to make a mold. Now don't get me wrong, Sam. I don't advocate lousy equipment, but everyone catches his share of egg-shaped cores and prints, etc. When it comes to pattern and core equipment, you can make some nice scrap with the best of equipment. It has been said that it's a pretty poor molder who cannot make his own scrap.

Before making up a large or medium job, you must advise the coremaker where and how the cores are to be vented and rodded, locate hook eyes, etc. Before starting the mold, be sure you have all the cores necessary. Have them brought out and study them and their relation to the pattern before starting to mold. This procedure saves many a casting.

Here is the most common practice with large cores when the vents are big and at the parting. The vent is cut all the way through the end of the print in the drag half of the core; but in the cope half of the core, the vent stops an inch or so from the end of the print.

This procedure allows the molder to "coke out" (that is, use coke breeze) in the vent passage in the mold just under the top face of the drag, bringing it up and out in a safe location, as shown in the accompanying drawing. Cutting a large vent out to the flask edge in the green sand face without "coking" increases the possibility of a runout or of letting metal into the

Circle 669 on Page 51→

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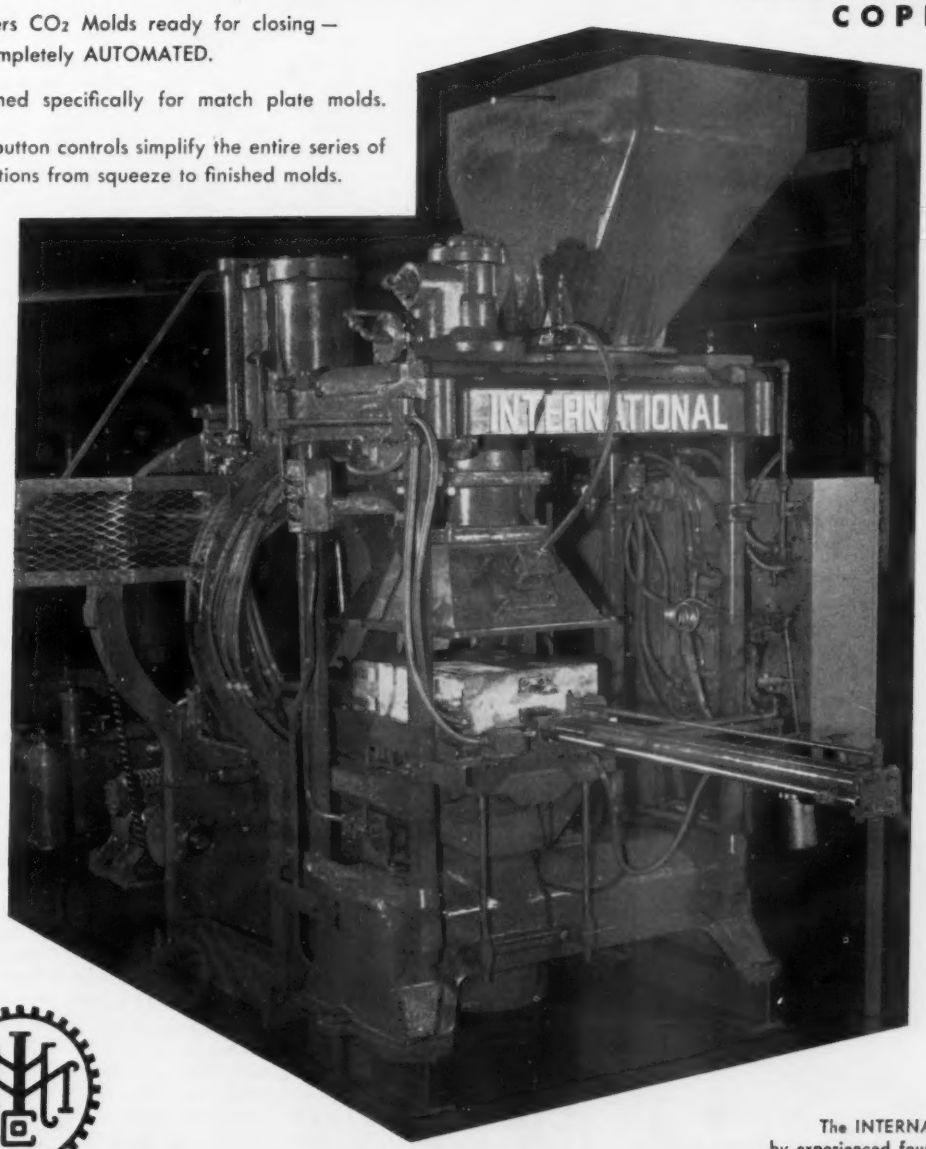

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core itself. It is better to have a smaller, poorer vent than to have the vent stop off.

A large core should have a solid bearing in the drag made by ramming up a brick or metal bearing set on the pattern print when the drag is made, and the cope print should be put up firm.

In a mold where the core is almost entirely surrounded by metal, the vents should be piped out through the flask and lit off at once.

A tapered or cone print in the cope which has been partially cut away for a riser should be stopped off at the top, the vent taken down through the drag, and a wire core tie used. A feather ring or crown of fire clay mud (fire clay and light lube oil) around the top of a tapered print on the cope core usually forms a suitable seal.

Prior to setting cores, fillet the edges around all prints. Using corn flour for a tryoff, set the cores in the drag straight and level. After tryoff, having made any necessary repairs, place a dough roll, use a prepared seal or core paste, and make the final set. Try off the cope with cereal. Blow out mold coke under the vents you wish to use, and stop off the other. When possible, use the vents which come through prints at unrisered sections. Stop off unused vents. If the job is planned properly, the coreroom will have open vents only where they are needed and used.

Cores which are apt to come apart at the joint should be bolted, sulfured or leaded; a cross tie is helpful, but is limited to strengthening the ends. Hook holes, leaded holes, and sulfured holes are covered with green sand and dry blacked with a soft brush and plumbago.

Remember that jobbing with loose patterns is still more of an art than a science. Even today, I am inclined to think it will be so for some years to come. You can't take a loose job and a slipstick and come up with anything. You have to get your hands in the sand and know what you are doing.

Here are a few hints: 1. Never set burnt, dirty, wet, green, or broken cores. 2. Don't break edges of the cavity when setting the core. 3. Place cores directly in the print. Do not slide them into place. 4. Use a crane or hoist to set heavy cores. 5. Don't close any mold if you are in doubt as to its quality. 6. Be sure you have all the cores—and the right ones! 7. Try off cores and copes on all complicated or large jobs. 8. Gate to prevent incoming metal from impinging on the core. 9. Use core ties rammed in the cope on prints which have been cut partly away for gates or risers. Vent the core through the drag if possible.

10. When cores must be hung in the cope, mark hanger come-through points on the pattern with headless nails on which you can set and bring dowels up through the cope. This practice avoids much trouble and assures good tie-ups. 11. Supply a good stout bearing in drag prints for heavy cores. 12. Make sure vents are open and will not stop off. 13. Coke the vent passages on large molds and bring them out to the flask edge under the top face of the drag. 14. Use dough roll, prepared sealer, or paste over and under prints. 15. Pipe out vents on cores almost completely surrounded by metal. 16. Fillet core prints, mold, and core. 17. Cover core hook holes and sulfur, lead, or bolt holes with dry-blacked green sand. 18. When making a small patch on a core for dressing up little pits, use mud made with

An Economical, Useful Foundry Screen

The Leahy® Screen with or without FlexElex® heating of the jacket is most useful in the foundry. Engineered especially for fine mesh screening, it is ideal for the screening of foundry sands. For damp materials, integrated FlexElex® heating is highly efficient. When different sizes are a problem, changing of screen jackets requires but a few moments. Send for Bulletin 15-J.

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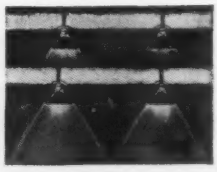

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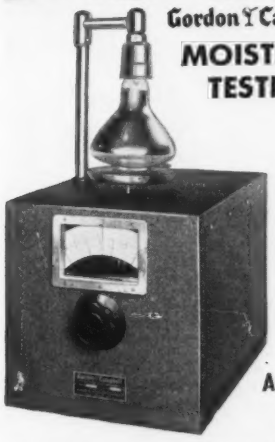

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Circle 671 on Page 51

plumbago and light motor oil—never water. 19. Clay for crowns and vent sealing always is mixed with oil.

20. Use green sand cores whenever possible. 21. A good, dry core made from a poor mix is better than one made from a good mix, but green or improperly dried. 22. Cores likely to come apart should be leaded, sulfured, or bolted in addition to being pasted. 23. Don't set hot cores in a cold mold or cold cores in a hot mold. 24. Don't blow cores from a casting in a water barrel. This practice is extremely dangerous. 25. Don't believe that the core made with the least gas-producing ingredients always is the best one. Time, pressure, section, metal temperature and composition, and design of the casting all dictate the type and kind of core mix and binder necessary to produce the best results.

Sincerely,
Charlie

Recommends Safe Practices for Inert-Gas, Metal-Arc Welding

The 2nd edition of "Recommended Safe Practices for Inert-Gas Metal-Arc Welding," has been published by the American Welding Society. Based on laboratory studies, experience of industry to date, and an extensive review of the literature and industrial records, the report covers all aspects of safety involved in the use of inert-gas, metal-arc welding. It is available in pamphlet form for $1 from AWS, 33 West 39th St., New York 18, N. Y.

Norton Co. Opens New Plant

A plant designed for straightline production of a wide variety of refractory products was recently opened by Norton Co., Worcester, Mass. Of two-story construction with 80,000 sq ft of manufacturing space, the plant is designed to receive raw materials at one end and ship finished products by rail or truck from the other end, accomplishing all other manufacturing steps on the way through. It is situated adjacent to existing tunnel kilns which have been used to fire products of the existing refractory plant, about a quarter of a mile away. Handling time and labor will be substantially reduced as a result.

Circle 672 on Page 51→

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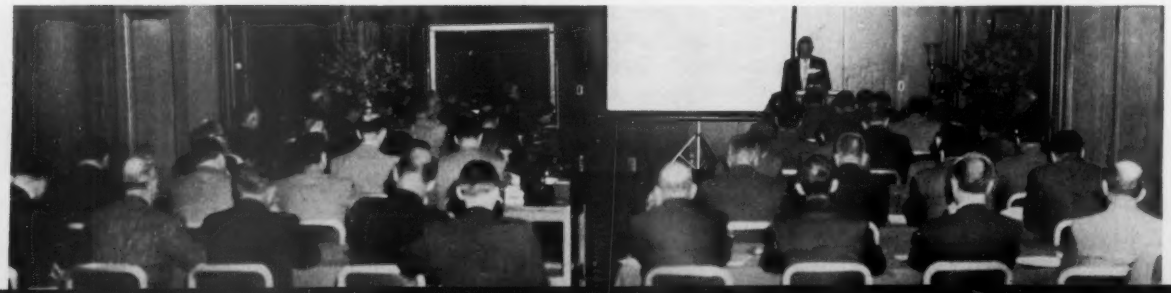
News Views

STEEL CASTINGS CONFERENCE: A conference on steel castings was held April 15-17 at the U. S. Army Engineer Research & Development Laboratories, Ft. Belvoir, Va. Members of the Industry Steering Committee are shown with Col. A. H. Davidson Jr., director of the Laboratories, and Allan L. Tarr, conference general chairman, also of the Laboratories, on the right. Left to right, G. K. Dreher, C. W. Briggs, K. W. Thompson, A. J. McDonald, R. A. Gezelius, and E. A. Schoefer

FOUNDRY EXPANSION: Gardner-Denver Co., Quincy, Ill., has completed a foundry expansion including new building construction and new equipment for its plant at LaGrange, Mo. The core department, shown here, has been enlarged, and two car-type ovens have been installed. New cleaning, material handling, and air compressing equipment also have been added. The additions are part of a 5-yr program to increase the plant's daily melt from 55 to 105 tons

BREAKING GROUND: Saxton W. Fletcher, president, J. O. Ross Engineering Div., Midland-Ross Corp., New York, breaks ground for a new office building in Mt. Prospect, Ill. It also will include facilities for Chicago personnel of John Waldron Corp. and Hartig Extruder Div..

CASTINGS CLINIC: Approximately 75 persons attended a gray iron castings clinic sponsored by Superior Foundry Inc., Cleveland, at Hotel Pick-Carter, Cleveland, April 9-10. The program included discussions of metallurgy, casting design, pattern equipment, gating, gray iron applications, and purchasing of castings; an exhibit of castings; and a visit to Superior



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You see here one of the largest shell mold castings now in mass production. It's the Edsel crankshaft. And an RCI phenol formaldehyde FOUNDREZ resin is used extensively to produce the shell molds.

Edsel production engineers have found many advantages in use of the shell mold process for this important casting. For example, the shell molds reproduce patterns more exactly. They are portable and use less sand. Castings have closer dimensional tolerance, require less machining. In general, foundry efficiency, flexibility and production rate are increased.

There are also good reasons why Edsel uses RCI FOUNDREZ resins. For one thing, continuity and quality control in resin manufacture are assured because RCI is a basic producer of both phenol and formaldehyde. In addition, 35 years of wide experience in synthetic resin manufacture is concentrated in RCI's Detroit plant, where these FOUNDREZ materials are produced.

If you have a foundry job where shell molding may offer advantages, write the RCI Foundry Division for full information on FOUNDREZ resins.

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Circle 673 on Page 51

Systematic arrangement of thousands of foundry patterns on adjustable steel shelving at Ansdale Co. speeds location of patterns and saves company $2500 annually

Systematic Pattern Storage

Speeds Delivery . . . Saves Money

A SYSTEMATIC foundry pattern storage system speeds pattern delivery and saves approximately $2500 a year at Andale Co., Lansdale, Pa. Pattern loss and handling damage virtually are eliminated by storage of all patterns on adjustable steel shelving, with locations keyed in a comprehensive file card system.

Andale's thousand of patterns are stored safely, conveniently, and in a minimum of floor space on adjustable, interchangeable steel shelving units. When the production department calls for a particular pattern, the pattern shop can deliver it immediately, even though it has not been used for a year or more. The exact location of each pattern is shown on the cards at all times.

Approximately 744 lineal feet of shelving provides 18,000 sq ft of storage space in Andale's 65 by 130-ft pattern storehouse, which is immediately adjacent to the pattern shop. The steel shelving, manufactured by Penco Metal Products Div., Alan Wood Steel Co., consists of 248 open-type units, each 3 ft

A glance at the records enables a pattern shop employee to locate instantly any pattern which is required

Card record describes each pattern and tells its exact location by shelf number and position. It also shows whether pattern is in use in some other place

						REMARKS:-	
						Small metal part.	
		Shelf 14-E	1-1-38				
		Smithe Steel Co.	2-2-51				
		Foundry	10-1-36				
		Shelf 18-G	2-10-39				
		Smithe Steel Co.	16-39				
		Shelf 14-A	6-8-52				
		Foundry	3-6-52				
	G4737W	Shelf 14-A	2-21-52			2-20-52	GLE.
PATTERN NO.	DRAWING	LOCATION	DATE	LOCATION	DATE	DATE PATT. MADE	MADE BY
14309	PART BODY CORE BOX PC.	SIZE 6" TPS PUMP		TYPE For Jones Pump Co.	SIZE		SHELF NO. 14

NEW . . .

BRASS and BRONZE FOUNDRY PRACTICE

By HARRY M. ST. JOHN

THIS VOLUME brings together in one place the facts and theories of brass and bronze foundry practice. Much material has been published on these subjects, but for the most part it is scattered through a variety of publications. Now brass founders have available a comprehensive, modern treatment of all aspects of brass foundry theory and practice in one source.

The 250 pages of *Brass and Bronze Foundry Practice* cover the entire range of brass foundry operations. Its 23 chapters discuss alloys, technical and operating procedures, quality control, testing, brass foundry economics, cost control, casting design, patternmaking, foundry layout, and salvage of waste material. The text is supplemented by 85 illustrations which clarify and enlarge on the subject matter. A complete index expands the usefulness of the book as a reference work.

Harry M. St. John, author of *Brass and Bronze Foundry Practice,* is exceptionally qualified to make this contribution to the progress of the thousands of foundries producing brass and bronze castings. Most recently, he was associated with Crane Co., where he was superintendent in charge of brass foundry, brass forging, and die casting of aluminum and zinc. He was awarded the William H. McFadden Gold Medal of AFS in 1947, for his many outstanding contributions to the society and to the foundry industry.

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85 illustrations

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Circle 674 on Page 51

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square and 8 ft 3 in. high. Units consist of posts, sway braces, and shelves bolted together to form a continuous rack. All shelves are adjustable on 1-in. centers to accommodate patterns of any size.

The first installation of this shelving was made five years ago. Because of Andale's satisfaction with the first installation, all succeeding additions to the storage area have used shelving of the same type.

Andale Co. designs and manufactures heat exchangers, strainers, and special valves of steel, aluminum, and other metals for use in chemical and industrial plants and in public utility installations. Complete units weigh as much as 100,000 lb, and individual castings run up to 15,000 lb.

Each pattern is numbered and listed on a separate file card. Records are cross-indexed by pattern number and equipment type. When the production department needs a certain pattern, it calls the pattern shop superintendent, C. H. Stover, who checks his card index to locate it. He can tell at a glance exactly where the pattern is—shelf number and location. If the pattern is in use at one of Andale's suppliers, the card record reveals the fact and tells where it was sent and when.

Mr. Stover, who devised this money-saving inventory control system, can pick the pattern from the shelf and ship it to the foundry in a few minutes. There are no delays, no lost or misplaced patterns, and no damage to patterns by a workman climbing over them or pushing them around to find a missing one. And instead of the yearly loss of $2500 in lost or damaged patterns before the system went into use, present losses amount to practically nothing—less than $15 annually.

National Safety Council Issues New Publications

A 40-page publication designed to promote safety in industry, "Rules for Safety" has been compiled by the National Safety Council, 425 North Michigan Ave., Chicago 11, Ill. It covers accident prevention and gives safety rules for using power tools, stacking material, lifting, and carrying.

A new volume of "Five-Minute Safety Talks for Foremen," the eighth in the series, is a compilation of talks that appeared in earlier books. The 52 talks in Book 8 range from "Why We have a Safety Program" to "Bumping into People and Things."

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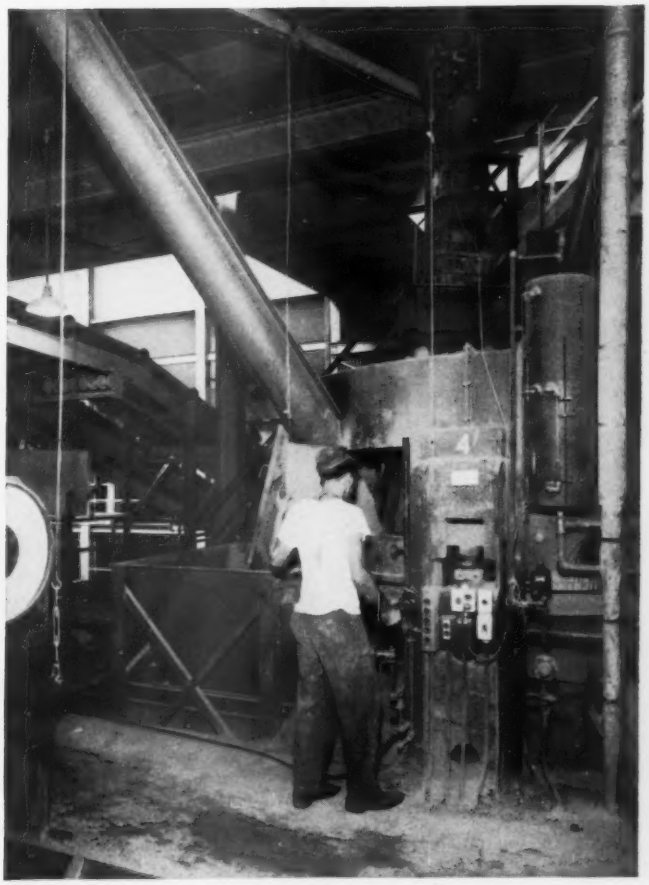

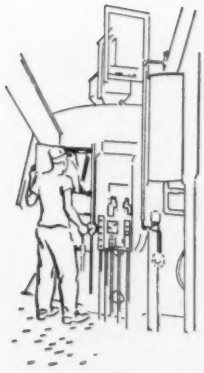

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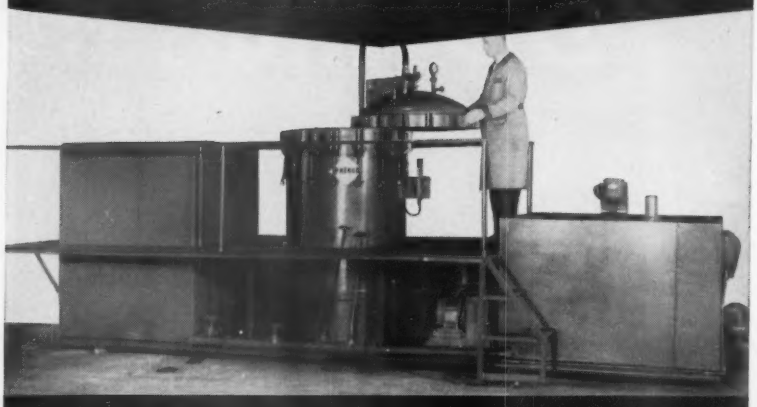

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F-7

Incentive Plans Are Aid To Accounting Procedure

Handling of Direct Labor Is Key to Effective Use

By John Taylor*

THE SUBJECT of incentives is a common one, but few people realize the full extent to which they can be used. For many years, incentives were considered only as a means of inducing an operator to increase his output in return for increased compensation.

In those days, incentives as such were piecework prices established as a specified monetary value per piece or ton or other unit of measure supposedly related to physical effort. And, unfortunately, in those days it was common practice to set those piecework prices mainly by opinion or personal judgment, with the result that inconsistent prices were not uncommon.

Use of Time Study—Just after the turn of the century, the practice of time study became recognized as a better method by which to establish prices. Time study as such had been originated earlier, but did not actually come into common practice until early in this century. The acceptance of time study throughout industry was slow, and, as a result, the situation of having tight and loose rates was still common after World War I.

It was about this time that standard data were developed, and several larger industries immediately began to use them. It was realized that standard data provide a consistent means of establishing standards. They completely eliminate the necessity for judgment or opinion, and, once established properly, they practically eliminate the need for time study.

Many Incentive Plans — Until about World War I, piecework was the most widely known type of incentive, and even today some individuals use this term when referring to any type of incentive system. Many types of incentive systems were developed and published, most of them the type of plan in which the standard for the job was in time rather than money. There are approximately 50 different types of incentive systems in addition to the piecework system. Some of the bet-

*Vice president, Norris & Elliott Inc., Chicago, management consultants. This paper was delivered to an accounting meeting of the Malleable Founders' Society in Cleveland on Feb. 27.

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ter known plans were the Halsey 50-50 plan, the Halsey 75-25 plan, the Task and Bonus plan, the Bedeaux System, the Dyer Unit System, the Norris Unit System, and the Standard Hour plan. The last three probably are the most widely used types today.

Basically, these three plans are much the same. The only real distinction between them is that two use standard minutes as the time standard, whereas the other uses the standard hour. At this point it is necessary to recognize an important fact concerning time study, standard data, and incentives: The particular procedure employed in time study does not necessarily dictate the type of standard data or the kind of incentive plan that can be used.

In other words, time study procedure using the continuous reading or snap-back method and using one watch, two watches, or three watches can be used for any type of incentive plan. The same thing can be said about determining the type of standard data to be developed.

The time study procedures and development, the analysis and proper co-ordination of time values in building standard data, and the decision to use a particular type of incentive plan do not necessarily guarantee a successful incentive program. Up to this point it might be said that everything done has been of a technical nature. The next, and very important step, is the groundwork necessary for the proper acceptance of the incentive program.

Introduction Is Important—Before the middle thirties, installation of a new incentive program or the revision of an old one required very little preparation for the supervisor or the employees. Rightly or wrongly, it usually was a case of announcing the new standards and telling the employees what was expected of them.

With labor relations today, such a procedure probably would guarantee the failure of the system. Today, the new system and the new standards must be thoroughly explained to the employees. They must be shown examples of how to compute their pay, and they must be sold on the principle of being able to earn more money for additional effort.

Since the transition from monetary incentive values to time incentive values, industry has been presented with the means whereby a properly installed incentive system can be an effective tool for different functions of management. For

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example, incentive time values are used by production control for machine loading various work centers so that realistic schedule dates can be developed. Manning tables can be developed to determine properly the required number of employees for different levels of production. Budgets can be administered more effectively by using projected direct-labor hours or minutes projected from the incentive standards. The accounting department can use direct-labor hours or minutes as a more satisfactory means for absorbing overhead. The accountant usually finds this procedure more advantageous because the base from which he works is not affected by changes in wage scales.

Direct Labor Is Key—Through proper understanding of the various facets of incentives, it becomes apparent that even a jobbing foundry can operate successfully under a standard-cost system. Understanding these possibilities better usually requires a change in thinking from the selling of tons of castings to selling of labor and material. Under such a cost system, the focal point of attention is direct labor, which must be kept pure as such. It should not include time lost between jobs, waiting for work, machinery breakdowns, etc.

A modern incentive plan establishes time standards only for the amount of work involved in a particular operation. It completely ignores nonproductive time, but within its structure contains a procedure whereby nonproductive time is shown separately. Assuming incentive standards established with proper recognition for cost accounting, lost or nonproductive time shown separately is charged to an expense account. When this is done, the total direct labor for an operation is pure direct labor and therefore varies only as the amount of work varies. This picture is the accurate one desired by the accountant.

Proper and effective lines of communication between the accountant and the industrial engineer easily can produce the necessary weeding out of untrue direct labor in any cost center. Since every accountant wants to have controllable direct labor in every cost center, this step is a vital one. Effective cost control never can be obtained with any incentive system which does not recognize standard cost principles in accounting. These statements are true regardless of the type of incentive plan employed.

The attainment of effective cost control without incentives is next to impossible except on operations which are mechanically controlled, and even then it is not necessarily attainable.

Introducing Cost Control—It was stated earlier that a successful incentive plan had to be sold properly to employees as well as to supervision, and the same thing is true in attaining good cost control. It is just as necessary for the employees and supervision to know why certain things are done as it is for them to know what they are to do. Supervision particularly must understand the necessity of keeping a direct-labor account a pure direct-labor account. It must be recognized that supervision may at times be lenient in allowing for lost time in order to keep the employee happy without being adequately concerned about where the time is charged.

In reviewing the requisites of good accounting to be derived from a good incentive plan, one must understand the quantity of work covered by the standard and the physical or material factor used in rela-

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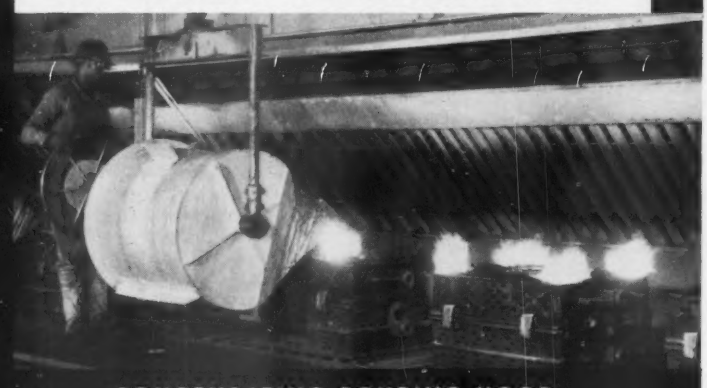

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tion to the time. He also must recognize that nonproductive, nonstandard work should be charged as expense.

Ignore Cost Per Ton—It should be noted that throughout this discussion no mention has been made of cost per ton. This point is being made here because numerous cost installations have proved that cost per ton may vary widely, and justifiedly so, even though the average weight per casting may not vary. The accountant also must recognize that effective incentive plans in foundries seldom recognize tons produced as a unit of measure. This point is illustrated clearly by incentive standards applied to core sand mixing.

The unit of measure used usually is pounds or tons of sand mixed, a figure which seldom has any direct relation to the total tons of castings produced. This same condition prevails fundamentally in all operations in a foundry and should be recognized when attempts are made to effect proper cost control.

It can be seen therefore, that modern incentive programs can be an effective tool for the accountant if used in the same manner in which they are used for incentive payment and if the accountant keeps his direct-labor cost center relatively as pure as the incentive standard used for that particular job.

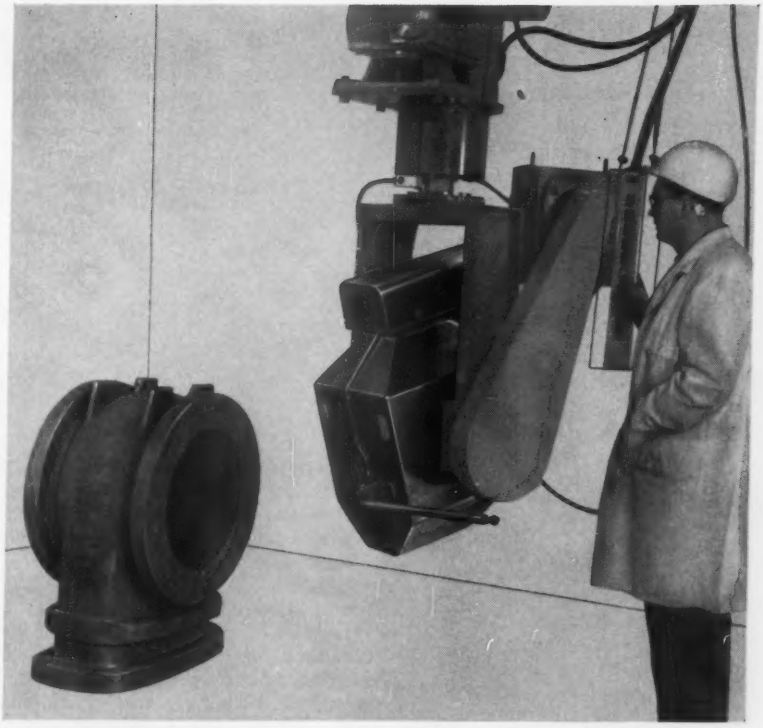
Book Review

Conveyor Terms and Definitions (Book 101), published by the Conveyor Equipment Manufacturers Association, Washington, D. C. Price $2.

An enlarged and up-to-date edition of an earlier publication, this volume defines more than 1200 conveyor types, parts, and related equipment. It contains 96 pages and more than 100 line drawings.

"Preferred" terms are accompanied by the definitions, and other commonly used terms are related to them by an extensive system of cross indexing. Major product, safety, and sanitation standards are listed also, with their sponsoring organizations. Provisions of the recently revised safety code B20.1-1957 are included.

American Standard MH4.1-1958, the official standard of the American Standards Association applying to conveyors and parts, supersedes B75.1-1956, which appeared in the earlier edition of this volume. It also is available, as Book 102, with standard punching for inclusion with other standards.



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Around the Country

NEWS REPORTS FROM

Muskegon . . . Chicago . . . Pittsburgh . . . Detroit . . . Philadelphia

Muskegon, Mich.— Fifty years ago, in the spring of 1908, three young men invested $1000 each to begin a new business venture. Today, Campbell, Wyant & Cannon Foundry Co., the company they founded, is one of the largest independent gray iron foundries in the world. It now is a division of Textron Inc.

Donald J. Campbell, Ira A. Wyant, and George W. Cannon, the three foundrymen, who paid themselves $15 weekly in that first year, founded their business in a tiny shop with an initial capacity of 5 tons of castings daily. Today, CWC operates six plants, four in Muskegon and one each at Lansing and South Haven, Mich., and normally employs upward of 2500 persons. Its payroll has risen from $7500 in 1908 to an annual figure of more than $11 million.

Observing its 50th birthday, CWC claims many noteworthy achievements, including casting the first 4-cylinder engine block; development of cast, out-of-round piston rings; and being first to develop the cast camshaft.

Actually, a small advertisement in the March, 1908, issue of FOUNDRY created the idea for the formation of CWC. It listed a "modern brass and iron foundry for rent or lease." Donald Campbell got in touch with his prospective partners, both supervisors in Chicago foundries, and they went to Muskegon, where they leased the small foundry of Racine Boat Works.

In 1956, when control of CWC was acquired by Textron Inc., the foundry that started with $3000 capital had become a $15 million business. In addition to its extensive work in the automotive field, it was a major supplier for the armed forces of America and its allies during World War II.

50 YEARS FOR CWC: Campbell, Wyant & Cannon Foundry Co., a division of Textron Inc., has grown in 50 years from a three-man operation to one of the largest independent gray iron foundries in the world. Shown here are general offices, laboratories, and production facilitties on Henry Street in Muskegon, Mich. CWC operates five other plants, in Muskegon, Lansing, and South Haven

Philadelphia— Mass suspensions for vacations at many plants will lead to an even further decline in foundry operations over the next several weeks. The Fourth of July period probably will be the dullest of all, but vacation periods will affect foundry production throughout August and probably at least until after Labor Day.

Over recent weeks, gray iron jobbers have been operating at around three to four days a week. Only in one or two cases are five-day schedules reported, but even then on a restricted basis as to workers employed.

Of the major classifications of castings, malleable seems to be holding up best. Producers, especially those turning out malleable fittings and electrical applications equipment, are operating at around four or five days a week. Steel casting shops are running around three days a week, probably at the lowest point this year. This slump reflects a lag in heavy industrial equipment, especially textile and paper machinery. The same lag also affects gray iron.

Nonferrous jobbing shops report no improvement. They are still operating at three to four days a week and see little work ahead over the next several weeks. Captive shops are fairly active in some lines, notably in ship work and some types of industrial valves and pumps. In no instance does there appear to be any important overflow of work from captive shops to independent plants.

Detroit— Hottest rumor concerning new engines is that General Motors Corp. will introduce a pancake-type engine early in 1959. It is said to be a fabricated unit with finned, cast gray iron cylinders bolted to a cast aluminum crankcase. Other aluminum castings include heads, pistons, and transmission and other housings.

The cylinders are to be cast in shell molds on a new line said to be planned for installation at the Chevrolet foundry in Tonawanda, N. Y. It is believed that this will be a complete resin-bonded sand line with molds, barrel cores, and pin cores being made in straight-line production sequence. The aluminum castings are to be made in permanent molds at a different plant. It is expected that castings production for the flat, air-cooled engine will begin around Dec. 1.

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Circle 682 on Page 51

gine is not known. Harlow H. Curtice, GMC president, stated at the company's 50th annual meeting that the question of a smaller car was under study. He expressed the opinion, however, that an American-made car patterned after family-type foreign cars would have only limited public acceptance. Present American autos represent the desires of most of the car-buying public.

Perhaps the smaller car he refers to might be along the line of the Studebaker-Packard Corp. car to be introduced this fall. It is said to be an economical car rather than an economy car, with wheelbase and over-all length considerably shorter than those of current Scotsman models, although inside dimensions are about the same.

Ford Motor Co. is rumored to be experimenting with a four-cylinder gray iron engine. A number of castings have been produced at its Cleveland foundry and the engines assembled at the Lima, Ohio, plant. It would appear that this engine is intended for a smaller car, although how small is anybody's guess. A few months ago Ford was understood to have 19 front-drive small car designs under contemplation. Perhaps now the company has settled on one or two possibilities.

In the field of aluminum engines, General Motors has announced a series of three V-8's. They look like conventional cast iron engines. Hand-built and not production prototypes, they weigh about 30 per cent less than standard engines of comparable displacement and horsepower. They are high-output, liquid-cooled power plants, higher in compression ratio than conventional engines, which now average about 9½ to 1.

One obstacle to aluminum engines in the past has been a wear-resistant cylinder bore material. Several aluminum alloys with good wear-resistance have been tested in the engines. Cost per pound of molten metal is about the same as that of common aluminum casting alloys. Several cylinder bore coatings said to be more desirable than chrome plate also have been tested successfully.

Chicago—With its two blast furnaces on the east bank of the Calumet River and the coke plant on the west bank, Interlake Iron Corp., the Chicago district's principal producer of merchant pig iron, long has had an awkward transportation problem in supplying the stacks with coke. It has been necessary to haul the coke 10 miles by rail and to cross nine public highways.

This procedure is about to be changed, however, with completion of a suspension bridge said to be the only one of its type in this vicinity. It will carry a coke conveyor and gas and steam belt 130 ft above the river.

The bridge is the most spectacular unit in a $35 million, eight-year expansion program, now in the final stages, which will make Interlake's Chicago plant the biggest of its four facilities.

From end to end, including the connections with the coke and blast furnace plants, the bridge is two-thirds of a mile long. Built by American Bridge Div., United States Steel Corp., it has a center span 510 ft long. The two main towers are 191 ft high and are set in reinforced concrete footings. More than 550 tons of steel were used in the structure.

The coke conveyor belt, 42 in. wide, will travel 300 fpm and will carry 250 tons of coke an hour. One of the two gas lines is 84

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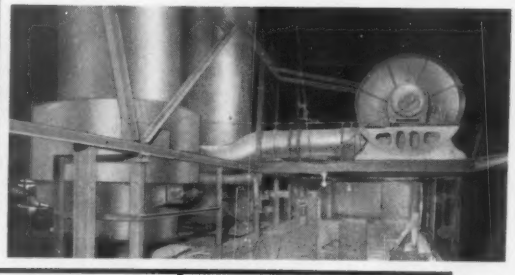

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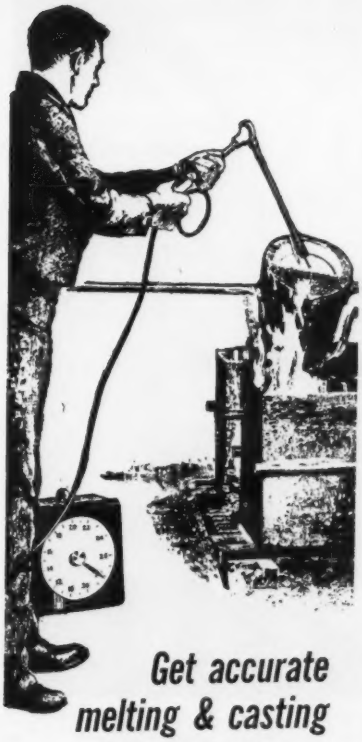

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Circle 684 on Page 51

in. in diam, and the other is 36 in. The steam pipe is 14 in. in diam.

Expansion has increased capacity of the Chicago plant to 600,000 tons of pig iron annually from 450,000 tons in 1950. To meet the needs of possible future expansion, the suspension bridge has been designed to accommodate a 50 per cent increase in carrying capacity.

Chicago's proposed new air pollution ordinance which was introduced in City Council on Jan. 17 is still in the hands of the joint committee on health, zoning, and building. Dates for public hearings have not yet been announced.

Pittsburgh— Despite an upturn in district steelmaking, foundries report little or no improvement in their sales. Chances for recovery in July are considered slim, since vacations will slow the output of consuming industries.

Job shops are operating at 40 to 50 per cent of capacity. Their backlogs are so small that they can't tell from one week to the next whether they'll be able to keep their doors open. With so much idle capacity and so little business to go around, they're under heavy pressure to cut prices.

A steel foundry reports that railroad, refractory, and electrical equipment orders are at such low ebb that it can operate only three or four days a week. Says a company spokesman: "In my opinion, we haven't hit bottom yet. It'll be another three or four months before we see an uptrend."

Sharing the view that no important gains can be expected before September, a gray iron producer thinks the worst may be over. "Our sales started to pick up a little bit in April," he explains. "By May, we were able to call everybody back. For the last six or seven weeks, we've been pouring every day, with about a third less tonnage than a year ago."

Foundries that supply castings to manufacturers of rolling mill equipment report satisfactory operations. Their customers have big backlogs and get few cancellations in spite of the steel recession. Outside sales of a foundry whose business is largely captive are described in these terms: "Orders from manufacturers of hydroelectric power plants and forging machines have been good. Hydraulic press work is down, and railroads are way below normal."

United Engineering & Foundry Co. will spend $1.75 million at its Vandergrift, Pa., plant

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- **Helps Bonding Action . . . Improves Green Strength**
- **Increases Porosity . . . Protects Against Blowholes**

Here's a super-refined hardwood flour ideally suited to the high purity requirements of shell mold mixes, green sand molds, and core sand mixes. Consistently pure, uniform in mesh size and water content from batch to batch, it combines top quality with outstanding economy. Find out how WILNER BIRCHWOOD FLOUR will improve *your* castings and cut molding costs. Send coupon for specifications and free testing sample.

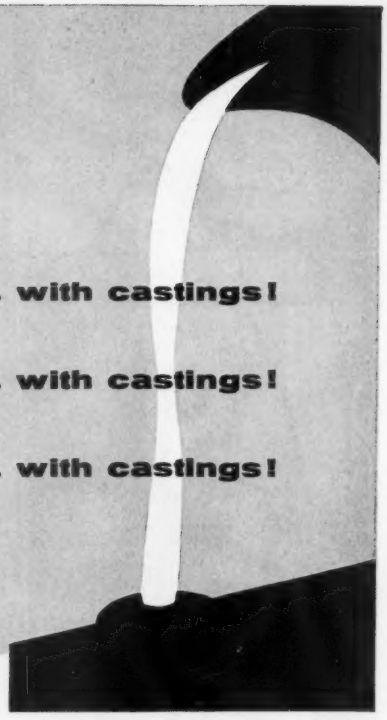
WILNER WOOD REFINERY
A DIVISION OF
WILNER WOOD PRODUCTS CO.
NORWAY, MAINE

Please send specifications and sample of Wilner Birchwood Flour.

NAME .....
TITLE .....
COMPANY .....
STREET .....
CITY..... ZONE..... STATE.....

Circle 685 on Page 51

castings are wonderful!



What is the only way to make large metal parts of complex shape economically? . . . . . with castings!

How can you make the most small parts at lowest cost—by the million, if you need to? . . . . . with castings!

What is the best way to make parts with smooth changes of stress flow? . . . . . with castings!

THESE ARE THE FACTS AGGRESSIVE FOUNDRYMEN ARE TELLING, individually and together, through their societies—in the grey iron, nonferrous, malleable and steel fields.

They add one more fact:

good design and consistent quality build more casting business

The buyer of castings requires only that his standards for reliable service be met.

THEORETICAL PERFECTION is needlessly wasteful to him . . . and costly to you.

we can help you make better castings—cheaper!

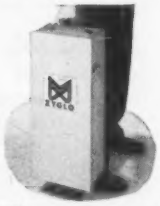
In scores of the best known foundries across the country Magnaflux Test Methods are now considered essential to reliable lowest cost casting production. If you are not now using them, we suggest especially that you investigate:

1. STRESSCOAT

The Magnaflux stress analysis tool that shows where high stresses occur—*during your design or pilot runs.* Shows whether stresses are detrimental or harmless. Leads to easy design correction.

2. MAGNAFLUX-MAGNAGLO

Magnaflux Magnetic Particle Inspection Methods that show *which* cracks or defects are significant and which are within the range of safe acceptance and good service. Test pilot castings also, for best set-up! ALSO: Magnaglo automatic for volume testing.



3. ZYGLO

Provides the same testing benefits for nonferrous casting control, pilot castings, etc. Starts as low as $125 with new ZA-43 Zyglo Kit shown here.

Also eddy current instruments to control hardness, heat-treat, etc., and sort mixed alloy lots.

When you use these Mx test methods—*with assurance*—you can sell more castings, to more people—for more uses. This, of course, means bigger markets, for you, *from now on!*

For the evidence, ask any foundry that has adopted the "Magnaflux Plan of Casting Control." Or ask a Magnaflux Engineer to outline it to you.

MAGNAFLUX CORPORATION

THE HALLMARK OF QUALITY IN NONDESTRUCTIVE TEST SYSTEMS

MAGNAFLUX CORPORATION

7350 W. Lawrence Avenue
Chicago 31, Illinois

New York 36 • Pittsburgh 36 • Cleveland 15
Detroit 11 • Dallas 35 • Los Angeles 22

Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1956	794,581	171,181	245,421	376,230	.....
1957					
Mar.	74,527	13,914	22,974	37,521	107,963
3 mo.	216,977	41,481	65,644	109,026	.....
Apr.	68,284	14,287	20,376	33,493	98,113
May	65,108	12,705	20,708	31,602	94,748
June	58,547	11,585	17,180	29,700	88,086
July	52,173	10,447	16,322	25,339	89,430
Aug.	55,735	10,996	18,398	26,319	89,826
Sept.	58,692	11,367	17,820	24,900	93,720
Oct.	64,140	11,570	20,543	31,936	91,817
Nov.	58,898	10,411	18,611	29,753	91,860
Dec.	53,102	9,302	16,724	26,978	86,323
Total	751,656	144,151	232,326	369,086	.....
1958					
Jan.	57,845	10,724	18,082	28,937	77,067
Feb.	50,695	9,601	15,456	25,279	75,647
Mar.	50,547	9,311	15,255	25,918	63,600
3 mo.	159,087	29,636	48,793	80,134	.....

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1956	951,868	557,636	812,905	466,845	138,963	78,073	.....
1957							
Mar.	78,013	48,311	64,560	40,645	13,453	7,666	89,431
3 mo	242,018	146,548	501,660	123,636	40,338	22,912	.....
Apr.	80,271	51,320	65,990	42,810	14,281	8,510	83,116
May	76,504	46,277	63,058	38,072	13,446	8,205	79,787
June	72,556	44,639	59,829	36,892	12,727	7,747	76,331
July	57,748	34,876	45,100	27,290	12,648	7,586	80,694
Aug.	65,426	39,644	55,320	33,781	10,106	5,863	84,876
Sept.	62,457	38,397	52,281	31,658	10,176	6,739	83,385
Oct.	77,667	45,989	66,043	39,269	11,624	6,720	82,995
Nov.	67,904	38,085	55,564	31,036	12,340	7,049	80,074
Dec.	60,425	34,343	48,694	27,218	11,731	7,125	74,863
Total	862,976	520,118	713,539	431,662	149,437	88,456	.....
1958							
Jan.	62,734	34,920	51,440	28,516	11,294	6,404	67,292
Feb.	54,650	31,006	45,419	25,381	9,231	5,625	59,047
Mar.	51,708	29,624	43,368	24,333	8,340	5,291	54,330
3 mo.	169,082	95,550	140,227	78,230	28,865	17,320	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1956	966,306	866,545	57,522	.....
1957				
Mar.	77,418	69,258	4,445	49,135
3 mo.	231,527	206,806	13,143	.....
Apr.	77,167	69,141	4,316	48,148
May	75,347	67,251	4,421	46,791
June	70,959	63,910	3,590	44,232
July	60,621	54,847	3,010	44,175
Aug.	71,233	64,953	3,278	40,446
Sept.	70,804	64,470	3,243	40,298
Oct.	81,836	74,391	3,693	39,063
Nov.	70,187	63,944	3,006	34,249
Dec.	65,708	59,606	3,046	31,509
Total	875,389	788,319	44,696	.....
1958				
Jan.	69,707	63,294	3,327	30,341
Feb.	58,356	52,579	3,202	27,243
Mar.	60,157	54,007	3,395	25,434
3 mo.	188,220	169,880	9,924	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1956	36,168	33,580	.....
1957			
Mar.	2,970	2,804	7,690
3 mo.	8,838	8,294	.....
Apr.	2,896	2,723	7,542
May	2,832	2,706	7,188
June	2,973	2,817	6,765
July	2,544	2,384	6,964
Aug.	2,315	2,150	6,222
Sept.	2,279	2,071	5,705
Oct.	2,192	2,093	5,318
Nov.	1,920	1,806	4,802
Dec.	1,533	1,408	4,823
Total	30,322	28,452	.....
Jan.	1,881	1,756	5,227
Feb.	1,803	1,730	5,589
Mar.	1,975	1,860	5,555
3 mo.	5,659	5,346	.....

PRODUCTION WORKERS

Estimated Number	March 1958	Feb. 1958	March 1957
Ferrous	165,600	172,900	203,300
Nonferrous	51,200	52,000	68,000
Average Weekly Earnings			
Gray Iron	$79.52	$78.94	$82.99
Malleable Iron	83.39	84.45	83.50
Steel	89.65	90.38	97.86
Nonferrous	89.71	89.24	91.58
Average Weekly Hours			
Gray Iron	35.5	35.4	38.6
Malleable Iron	36.9	37.7	39.2
Steel	37.2	37.5	42.0
Nonferrous	38.5	38.3	40.7

Source: Bureau of Labor Statistics.

GRAY IRON CASTINGS—SHIPMENTS

(Net tons[1])

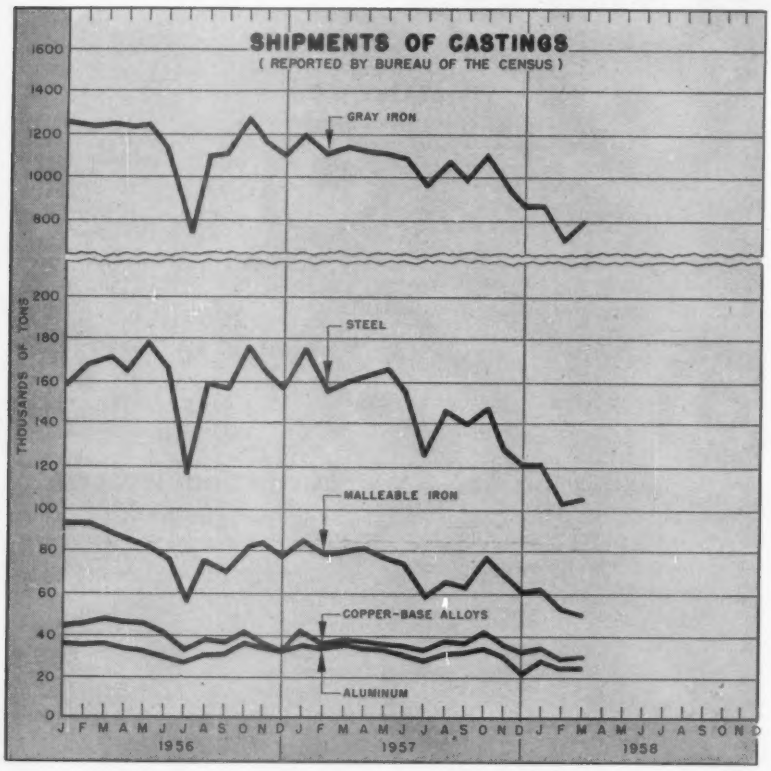
	All Castings		Miscellaneous Castings		Nodular Iron Castings	Heavy Steel Ingot Molds	Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	Total	Total	Total[3]	Total[3]	
1956	13,860,527	7,963,135	8,265,526	3,650,735	.....	2,624,146	406,191	1,746,902	817,762	.....
1957										
Mar.	1,133,146	604,481	713,767	305,104	.....	214,775	36,995	108,158	59,451	934,847
3 mo.	3,449,479	1,828,808	2,181,049	927,676	.....	706,862	98,213	298,373	164,979	.....
Apr.	1,120,349	611,443	699,395	298,319	10,235	192,199	36,979	128,710	63,066	899,074
May	1,112,096	625,496	674,460	291,557	11,206	192,336	34,406	141,685	69,209	879,825
June	1,058,464	599,494	630,513	274,115	10,207	193,640	32,087	131,360	70,864	853,012
July	954,102	523,489	565,897	243,187	10,901	190,434	31,209	106,532	60,030	825,676
Aug.	1,075,957	596,779	630,130	265,185	10,339	205,655	28,976	138,209	72,987	825,676
Sept.	990,139	563,477	579,444	259,649	10,253	202,914	23,681	119,689	64,411	805,301
Oct.	1,099,554	601,109	668,895	282,024	11,974	210,521	26,306	122,149	71,683	740,169
Nov.	940,138	482,732	599,292	242,847	10,601	166,652	24,302	91,138	58,754	704,623
Dec.	864,226	443,670	557,154	226,356	9,810	148,074	23,173	73,500	62,325	675,838
Total	12,664,504	6,876,497	7,786,229	3,310,915	.....	2,409,290	359,332	1,351,345	758,308	.....
1958										
Jan.	868,255	436,398	580,545	229,014	10,800	135,110	23,511	78,863	50,226	638,069
Feb.	753,306	389,708	503,175	203,717	10,245	116,168	25,959	67,606	40,398	632,490
Mar.	795,568	446,822	499,751	215,916	9,485	125,887	24,777	87,716	57,437	589,912
3 mo.	2,417,129	1,272,928	1,583,471	648,647	30,530	377,165	74,247	234,185	148,061	.....

STEEL CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1956	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....
1957										
Mar.	160,054	124,416	29,968	121,089	93,466	27,683	38,965	30,950	2,285	503,407
3 mo.	484,226	379,909	87,239	361,283	281,479	80,482	122,943	98,430	6,757	.....
Apr.	162,498	124,549	29,708	122,894	93,512	27,624	39,604	31,037	2,084	497,632
May	164,575	125,431	32,840	124,840	94,635	30,926	39,735	30,796	1,914	504,990
June	153,647	119,353	31,338	116,759	91,009	28,766	36,888	28,344	2,572	494,267
July	122,018	90,037	22,803	91,730	67,719	21,426	30,288	22,318	1,377	489,390
Aug.	145,926	111,080	33,641	113,167	86,407	31,639	32,759	24,673	2,002	471,190
Sept.	139,002	105,611	29,718	106,261	80,871	27,885	32,741	24,740	1,863	438,510
Oct.	146,397	113,216	31,477	110,100	85,144	29,320	36,297	28,072	2,157	395,907
Nov.	127,115	98,436	26,892	93,343	71,846	25,105	33,772	26,590	1,787	362,948
Dec.	120,787	92,125	23,403	88,101	66,468	21,808	32,686	25,657	1,595	327,337
Total	1,766,191	1,359,747	349,059	1,328,478	1,019,090	324,951	437,713	340,657	24,108	.....
1958										
Jan.	120,722	94,717	22,545	87,525	68,203	21,115	33,197	26,514	1,430	304,907
Feb.	103,297	79,708	16,647	74,283	56,781	15,273	29,014	22,927	1,374	282,358
Mar.	106,233	82,195	16,180	77,564	60,208	15,240	28,669	21,987	940	252,840
3 mo.	330,252	256,620	55,372	239,372	185,192	51,628	90,880	71,398	3,744	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.


SHIPMENTS OF CASTINGS
(REPORTED BY BUREAU OF THE CENSUS)
THOUSANDS OF TONS
GRAY IRON
STEEL
MALLEABLE IRON
COPPER-BASE ALLOYS
ALUMINUM
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1956
1957
1958

COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1956	74,454,264	73,814,941	2,856,395
1957			
Mar.	6,895,077	6,804,267	233,176
3 mo.	19,968,311	20,206,623	704,403
Apr.	6,436,259	6,396,886	227,609
May	6,631,807	6,521,105	220,063
June	6,361,611	6,317,615	188,877
July	6,501,595	6,375,616	180,698
Aug.	6,519,973	6,401,949	206,907
Sept.	6,296,519	6,186,475	199,226
Oct.	6,275,567	6,120,485	208,720
Nov.	5,615,746	5,425,296	199,052
Dec.	5,164,965	5,099,556	173,470
Total	75,772,353	74,961,606	2,509,025
1958			
Jan.	4,762,050	4,643,022	192,098
Feb.	4,078,728	4,030,849	171,362
Mar.	4,340,634	4,206,655	168,641
3 mo.	13,181,252	12,880,366	531,981

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1957	1958
Jan.	25,681	20,468
Feb.	20,769	17,413
Mar.	21,948	18,825
Apr.	23,507	18,009
May	22,037	.....
June	18,888	.....
July	16,695	.....
Aug.	19,654	.....
Sept.	19,670	.....
Oct.	22,800	.....
Nov.	19,767	.....
Dec.	16,875	.....
Total for year	248,291	.....

Source: Defense Council of the Ingot Brass and Bronze Industry.

ZINC-BASE ALLOYS

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1956	693,728	449,516	.....
1957			
Mar.	61,378	40,593	64,466
3 mo.	189,135	119,362	.....
Apr.	54,982	34,801	59,534
May	53,565	35,676	66,712
June	49,356	33,206	64,137
July	48,379	29,418	64,043
Aug.	49,829	34,040	64,789
Sept.	47,736	33,838	68,122
Oct.	62,332	39,990	69,275
Nov.	58,689	35,005	63,665
Dec.	49,597	29,998	58,792
Total	663,600	425,334	.....
1958			
Jan.	50,568	30,368	55,883
Feb.	42,687	27,482	50,676
Mar.	39,719	26,782	43,366
3 mo.	132,974	84,632	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1957	1958
Jan.	117.9	57.9
Feb.	188.4	57.6
Mar.	127.0	85.9
Apr.	101.1	88.7
May	136.2	....
June	187.5	....
July	98.6	....
Aug.	231.3	....
Sept.	113.9	....
Oct.	145.3	....
Nov.	59.6	....
Dec.	61.4	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average.

Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

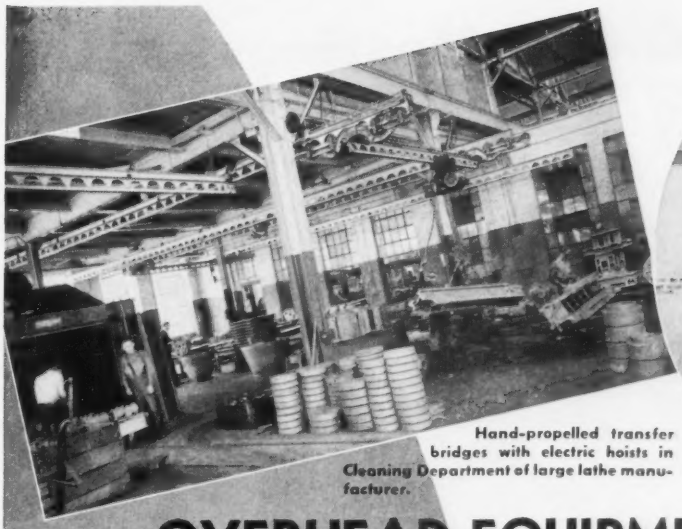
(Gross tons*)

	All Scrap Total	By Types of Furnace—Cupola Total	By Types of Furnace—Air Total	By Types of Furnace—Electric Total
1956	71,709,489	9,817,287	1,133,128	9,862,887
1957				
Feb.	6,038,436	804,185	93,902	834,843
2 mo.	12,669,240	1,678,949	196,684	1,762,342
Mar.	6,294,038	814,372	92,534	903,149
Apr.	5,816,309	835,027	97,289	807,922
May	5,753,435	812,141	92,260	786,210
June	5,430,607	744,790	80,063	705,590
July	4,897,752	652,773	68,504	629,395
Aug.	5,299,543	765,877	81,941	759,517
Sept.	5,033,998	721,125	82,948	672,597
Oct.	5,333,767	817,338	91,766	718,791
Nov.	4,858,489	716,095	72,871	589,879
Dec.	4,281,414	661,918	70,091	542,008
Total	65,688,592	9,220,405	1,026,951	8,876,400
1958				
Jan.	4,072,071	704,654	76,989	566,225
Feb.	3,491,441	611,394	64,971	466,657
2 mo.	7,563,512	1,316,048	141,960	1,032,882

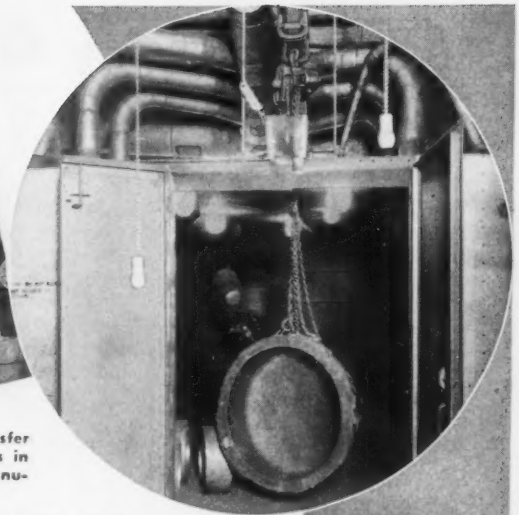
PIG IRON PRODUCTION AND CONSUMPTION

	Production**—Net Tons: Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption*—Gross Tons: Total	Cupola	Air	Electric
1956	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	66,967,618	4,786,011	261,377	211,193
1957									
Apr.	6,810,102	162,023	329,180	5,686,507	632,392	5,586,587	369,359	20,495	19,756
4 mo.	27,794,882	620,824	1,315,195	23,190,511	2,666,749	.....	.....	.....	.....
May	6,877,052	258,638	313,583	5,720,212	584,619	5,862,966	362,085	19,201	17,869
June	6,593,326	243,789	318,906	5,436,203	594,428	5,672,086	335,574	17,044	17,744
July	6,625,901	221,929	336,590	5,515,736	551,646	5,558,702	306,119	14,735	17,992
Aug.	6,719,763	228,378	298,269	5,451,691	741,425	5,769,995	349,988	17,540	25,948
Sept.	6,569,074	218,297	292,244	5,272,056	786,477	5,645,036	321,728	17,084	28,638
Oct.	6,454,450	164,944	303,104	5,390,851	595,551	5,669,624	354,364	18,466	24,691
Nov.	5,711,242	153,722	290,547	4,759,255	507,718	5,073,898	309,674	14,886	17,199
Dec.	5,212,624	165,268	228,897	4,394,869	423,590	4,565,635	288,219	14,754	13,881
Total	78,557,011	2,275,789	3,697,335	65,131,684	7,452,203	67,902,434	4,160,891	218,178	246,851
1958									
Jan.	4,785,269	100,097	232,862	4,036,451	415,859	4,208,692	306,794	16,102	14,426
Feb.	4,016,276	106,921	193,429	3,396,382	319,094	3,551,679	260,940	14,014	7,740
Mar.	4,418,778	156,386	227,785	3,645,353	389,254	.....	.....	.....	.....
Apr.	3,787,907	136,180	173,139	3,053,634	424,954	.....	.....	.....	.....
4 mo.	17,008,149	499,584	793,513	14,165,891	1,549,161	.....	.....	.....	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.



Hand-propelled transfer bridges with electric hoists in Cleaning Department of large lathe manufacturer.

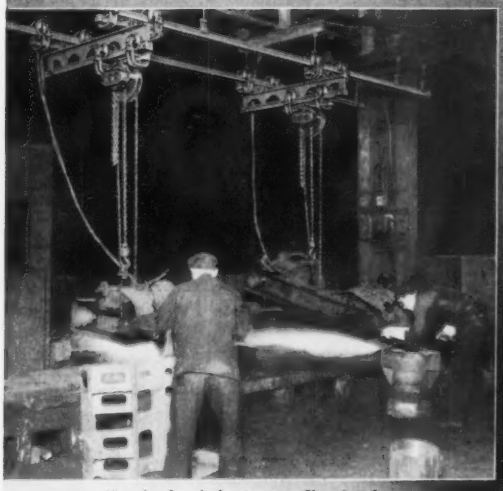


Heavy castings are carried into chamber and supported on overhead tramrail during blast cleaning.

OVERHEAD EQUIPMENT

Operates Smoothly in

Abrasive Plants



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Foundry Group Meetings

Twin City—At the April 8 meeting of the AFS chapter, Victor M. Rowell, executive vice president, Harry W. Dietert Co., Detroit, discussed "Synthetic Sand Practice."

Mr. Rowell declared, "Castings must be metallurgically sound as well as accurate dimensionally and attractive in appearance." He believes that the best approach is "to use a reasonably fine-grained sand with plenty of clay for good green, dry, and elevated temperature properties, low moisture and hard ramming. Water should be added to green sand primarily to plasticize and activate the clay.

The degree of plasticity should be more in the nature of a moist powder rather than a heavy mud. Improved flowability and reduction in mold wall movement tendencies can be achieved in this manner. Thus, a gain in finish and tolerance can be made simply by keeping the moisture as low as it can be worked. Obviously allowance has to be made for the equipment and rigging involved, but the lowest practical level of moisture is the most desirable in all cases.

At high temperature, sand grains will expand despite all attempts to prevent it. He pointed out, however, a broader grain distribution will tend to minimize this expansion somewhat, and combustible material plus clay tends to reduce expansion. To produce quality castings with controlled metallurgy, dimensions, and appearance, Mr. Rowell emphasized the need for a controlled molding medium. A question-and-answer period concluded the meeting.—*J. David Johnson, J. David Johnson Co.*

St. Louis— Speaker at the May 8 meeting of the AFS chapter was William G. Gude, managing editor of FOUNDRY, whose topic was "The Future of the Foundry Industry." This was also the date of the annual visit of members from the Missouri School of Mines AFS Student Chapter, Rolla, Mo., and Mr. Gude's talk proved of particular interest to both groups.

The chapter elected officers for the forthcoming year as follows: Chairman, W. C. Pickles, National Bearing Div., American Brake Shoe Co.; vice chairman, R. E. Hard, St. Louis Coke & Foundry Supply Co.; secretary, P. E. Retzlaff, Busch-Sulzer Bros. Diesel Engine Div., Nordberg Mfg. Co.; and treasurer, J. H. Thompson, Bodine Pattern & Foundry Co.

Directors elected to serve three years are T. E. Padkins, Scullin Steel Co.; R. C. Kane, Midvale Mining & Mfg. Co.; D. Arnette, Arnette Pattern Co.; and J. A. Cannon, Duncan Foundry & Machine Works, Alton, Ill.—*H. V. Boemer, Great Lakes Carbon Corp.*

New England— May meeting of the AFS chapter was held at the University Club, Boston, on the 14th. Approximately 135 attended. After a buffet dinner, Earl Harlow, Draper Corp., Hopedale, Mass., discussed "Foundry Cost."

Mr. Harlow distributed to those in attendance a report showing the actual breakdown of foundry costs and how they determine prices for any individual casting. His talk was well received and considerable discussion followed.—*F. S. Holway, Mystic Iron Works.*

Chicago—Chicago Chapter, AFS, wound up its 1957-58 season with a general meeting May 5 at the Chicago Bar Association at which Lester B. Knight, president, Lester B. Knight & Associates, Chicago, spoke on "Automation in the Foundry."

Since this was the Chapter's annual business meeting, President W. O. McFatridge, International Harvester Co., briefly reviewed the year's activities. Donald E. Meves, American Steel Foundries, reported on membership as chairman of that activity.

President McFatridge stated that there having been no additional nominations for chapter officers, election of candidates announced at the April 7 meeting, (FOUNDRY, May, p. 372), was declared unanimous. President-Elect Don G. Schmidt, metallurgist, H. Kramer & Co., assumed the chair, and his first official act was to present to Retiring President McFatridge the Chapter's "Oscar," the past president's statuette, in recognition of his service during the year.

Mr. Knight commented that the casting process is to make a component that will perform the required function at the lowest possible cost. Automation of the cast-

NEW OFFICERS: H. C. Winte, outgoing chairman, Philadelphia AFS Chapter, congratulates new officers. Left to right: Mr. Winte, Florence Pipe Foundry; E. A. Zeeb, Dodge Steel Co., new vice chairman, and T. R. Walker, U. S. Pipe & Foundry, the chapter's new chairman. (Photo by Leo Houser, Dodge Steel Co.)

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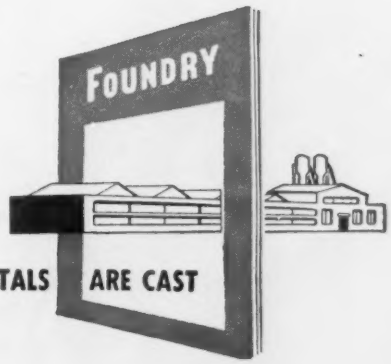

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40% less lift
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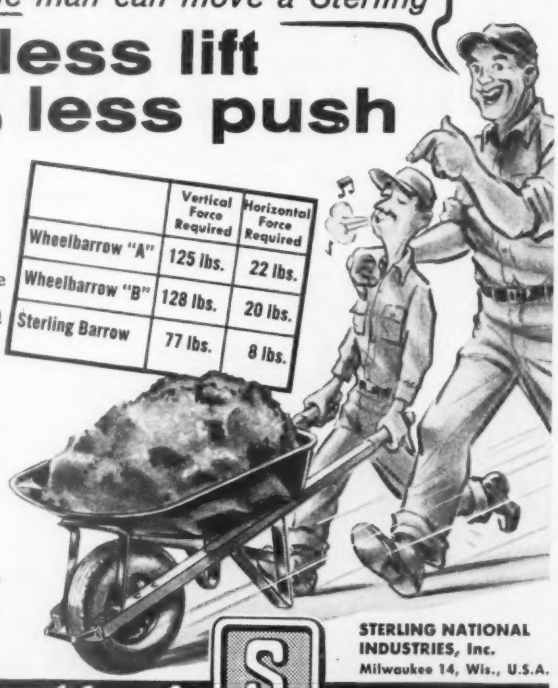
Wheelbarrow "B"	128 lbs.	20 lbs.
Sterling Barrow	77 lbs.	8 lbs.



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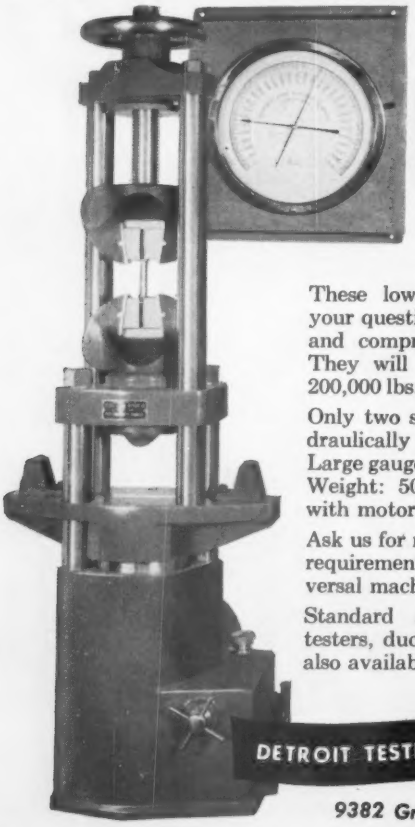

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Circle 690 on Page 51

ing process really is not new, he said, reminding his audience that cupola charging equipment was being automated 20 years ago. He observed that with manual operation, most machines are operated at only 5 to 25 per cent of their potential capacity. Purpose of automation and automatic cycling, therefore, is to obtain maximum capacity performance. There are two approaches to automation in the foundry, Mr. Knight said. One is accomplish automatic operation of equipment already available; the other is to determine what equipment is needed to accomplish an automated operation.

The Chicago Chapter will hold its annual golf outing at Nordic Hills Country Club, Itasca, Ill., Saturday, Aug. 9.—*Erle F. Ross.*

Pittsburgh—Pittsburgh Chapter of AFS met at the Webster Hall Hotel on Apr. 21 for dinner and a talk by Thomas W. Curry, director of research, Lynchburg Foundry Co., Lynchburg, Va. About 140 members attended.

Speaking on melting and metallurgical control of nodular (ductile) iron, Mr. Curry explained Lynchburg's melting practice, inoculation, pouring, and heat treating procedures. "I believe we can say safely that the use of ductile iron will be increased in the immediate future and that production will be on a rapidly ascending curve," he declared.

Illustrating his talk with slides, Mr. Curry commented on ductile iron's properties as cast, its unusual response to heat treatment, and its castability. A question period followed.

About 110 members attended the May 26 meeting, at which the discussion topic was "Future Manpower in Your Foundry."

Speakers included W. J. Hebard, director of industrial relations, Blaw-Knox Co.; Robert G. Schaefer, partner, Schaefer-Goodnow Foundries Inc.; Henry W. Dosey, principal, Connelley Vocational High School; and J. Alfred Berger, head of the metallurgical engineering department, University of Pittsburgh.

"Mechanization has led us to believe that we don't need any training in the foundry, that machines do all the work," Mr. Hebard declared. "But on large castings we get very little help from machines. Mechanics are our key men. We're kidding ourselves if we think they don't need real training. We pay for their shortcomings in scrap losses, high cleaning room costs,

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and in customer dissatisfaction."

Addressing himself to the problems of small and medium-sized foundries, Mr. Schaefer warned against the assumption that "young men don't want to come into our business." He emphasized that foundries can make themselves more attractive, that they have a vital role in modern technology, and that they provide numerous fringe benefits to their employees.

Describing vocational training of foundry apprentices, Mr. Dosey stated that only one boy had applied for foundry training at his school in the last four years. He blamed "terrific parental objection" for the lack of candidates. "Parents think all that's needed for foundry work is a strong back and a weak mind," he explained. "Foundrymen should tell the public what their work is, what it pays, and what the conditions are. They should send their apprentices to vocational schools on a co-operative basis and appoint committees to visit the schools."

Dr. Berger asserted that college men don't avoid foundries because they're afraid of getting dirty but because foundries don't offer sufficiently attractive pay. Other industries are offering metallurgical engineers starting salaries of $490 a month, he explained. "Foundries must meet this competition if they expect to recruit good men," he continued. "They must provide incentives and show their men that there are opportunities in the foundry."

The chapter elected these officers for 1958-59: President, I. W. Sharp, American Steel Foundries; vice president, J. D. Wilson, Bronze Die Casting Co.; secretary-treasurer, E. P. Buchanan, Pittsburgh Coke & Chemical Co.; director (term expiring in 1960), C. E. Peterson, Mackintosh-Hemphill Div. of E. W. Bliss Co.; director (term expiring in 1961), W. E. Mason, Westinghouse Air Brake Co.—*William V. Wallace.*

Northern California— April meeting of this AFS chapter featured a patternmaking clinic. Three local exponents of this exacting craft detailed the special phases of the work in which they have achieved signal success.

Mark Thomas, Pacific Pressure-Cast Products, explained the plaster-cast method of producing patterns and matchplates which provide excellent precision.

George Wettstein, Oakland Pattern Works, exhibited several plastic duplications of patterns which either

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Circle 693 on Page 51

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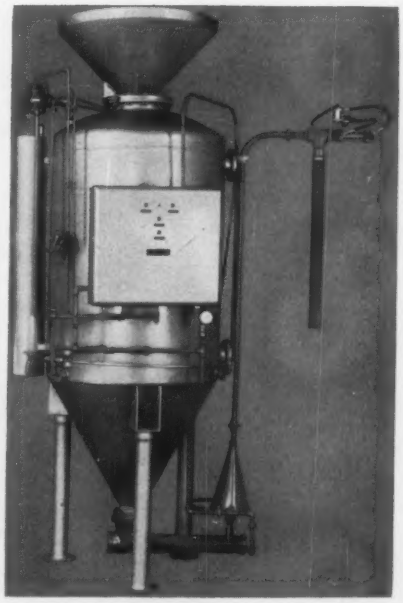

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required slight modification or had to be duplicated with speed and economy to facilitate increased production of castings. According to the speaker, plastic patterns can be made at lower cost and in less time than by conventional methods, and plastic has met the foundries' service conditions.

Angelo Castagnola, ABC Pattern Works, devoted his talk to the problems involved in producing patterns for shell castings in which he emphasized the methods, materials, and tolerances necessary for most satisfactory foundry performance under production conditions.

The annual chapter Ladies' Night was held May 9 at the Claremont Hotel in Berkeley, Calif. With approximately 130 foundrymen and their ladies present, food became the secondary consideration while the orchestra endeavored to meet the demands of a seemingly insatiable group of dancers.

Out-going chairman, Harold R. Hirsch, American Manganese Steel Div., American Brake Shoe Co., Oakland, Calif., extended his thanks to all who had assisted in making his term a success. He presented the first Andrew Ondreyco award of $100 and a special trophy to Conrad Rost, Empire Foundry, as the San Francisco Bay area's outstanding molder apprentice this year. The winner's name has been inscribed on a bronze plaque which will be permanently preserved for addition of future winners' names.

Chairman Hirsch then surrendered his gavel to in-coming chairman, Gordon Martin, Atlas Foundry & Mfg. Co., Richmond, Calif., who in turn introduced his staff of officers-elect. They are Donald C. Caudron, Pacific Brass Foundry Co., vice chairman; Hugh Prior, Superior Electrocast Foundry, South San Francisco, Calif., assistant program chairman; Davis Taylor, Wheelabrator Corp., San Carlos, Calif., secretary; and Fred Mainzer, Pacific Brass Foundry Co., treasurer.—*Harold E. Henderson, H. C. Macaulay Foundry Co.*

Metropolitan—April meeting of the AFS chapter had as its speaker O. Jay Myers, vice president, Foundry Division, Reichhold Chemicals Inc. His talk, "Sand Processes," was based on novel and complete flow sheets which classified the basic binders.

Under the headings of organic and inorganic binders, the classifications were further broken down into silicates, clays, and cements on the inorganic side and proteins,

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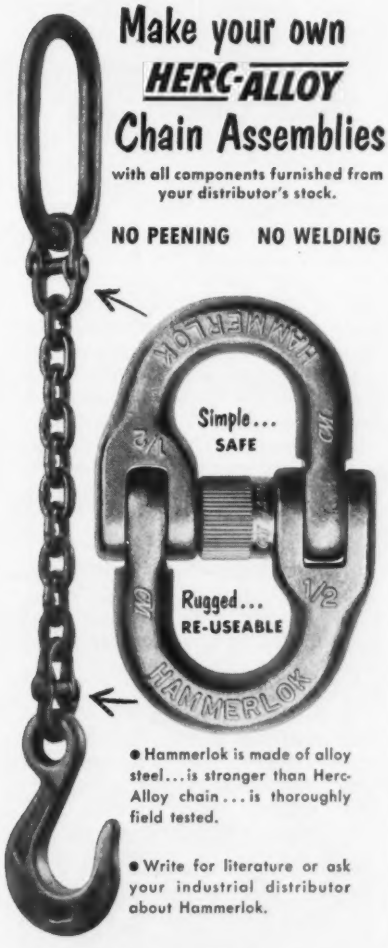

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oils, resins, and cereals on the organic side. Mr. Myers discussed the advantages and disadvantages of each of these as binders, both in combination and when used separately. A particularly interesting section of the charts was that covering resins and dealt with both natural and synthetic varieties.

Mr. Myers predicted that core oils in one form or another would be used extensively by the foundry industry for many years to come. Daniel Jones, New Jersey Silica Sand Co., served as technical chairman.—*C. H. Fetzer, International Nickel Co.*

Lehigh Valley— This foundrymen's association held its April meeting at Alumni Engineering Hall, Lafayette College, Easton, Pa. The speaker was M. Howard Clark, assistant division manager of the Middle Atlantic office, Liberty Mutual Insurance Co., whose talk was "Safety in the Foundry." Mr. Clark stressed that management must not only be receptive, but also must take an active part in a safety program if it is to succeed. He cited many case histories.

Immediately following dinner, the motion picture "3000 PSI" presenting manufacture of high-pressure gas cylinders at Taylor-Wharton's Easton plant was shown.—*Robert B. Fischer, Ingersoll-Rand Co.*

Northeastern Ohio—The AFS chapter paid tribute at its May 8 meeting to oldtimers, past presidents, and local apprentice winners in the 1958 AFS apprentice contest. Fred Pfarr, Lake City Malleable Co., national AFS director, represented AFS headquarters.

Of the oldtimers present, Henry M. Oehling, formerly of National Malleable & Steel Castings Co., Cleveland, boasted the longest service in the foundry industry—his experience goes back 72 years. Total service of the oldtimers present came to almost 900 years.

Apprentice winners in wood patternmaking were, in order, Edward Lamparyk, Modern Pattern Co.; Ronald Zipay, Warner & Swasey Co.; and Douglas Petery, Cove Pattern Works. Metal pattern winners were, in order, L. S. Uveges, Ford Motor Co., Cleveland Foundry Div.; Joseph Halm, Cove Pattern Works; and H. J. Brown, Ford Motor Co.

Winners in the iron molding competition were Carl Linger and Junior Samples of W. O. Larson Foundry Co., Grafton, Ohio, and

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COLLOIDAL GRAPHITE in various vehicles	**CORE PASTES** Strong bond, dry quickly.
HYDRO GRAPHITE (It's New!) Excellent permanent mold wash.	**SOAPSTONE—Talc**
FACINGS	**"MOLDUKO"** (Trade Mark Reg.) **CORE & MOLD PROCESS** Produces smooth castings. Stops "burning in". Air-dries.
CORE WASHES (All Types)	**PIPE REDUCER** Used on gates and risers in steel and iron foundries.
INGOT MOLD WASHES	**LADLE WASH**
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Joseph Kazimour, Superior Foundry Inc. Fred Taylor, Harsch-Ebaloy Foundry Co., took first prize in nonferrous molding.

Prizes were $25, $15, and $10 for first, second, and third places, respectively. Duplicate checks were presented the patternmaking winners by the Patternmakers' Association.

NEO Chapter concluded its 1957-58 season activities with its annual outing at Twin Lakes Country Club, near Kent, Ohio, on June 21. —*Jack C. Miske.*

Saginaw Valley— Final meeting for the year of this AFS chapter was held May 1. "Quality Control in the Foundry" by R. W. Gardner, Ford Motor Co., attracted approximately 150 attendants. Mr. Gardner discussed the formulation of a quality control department as well as the authority and responsibility of such a department. He presented slides to illustrate the types of control systems which the Ford company uses and discussed the effectiveness of a quality control program. A question-and-answer session concluded the meeting. —*R. J. Gleffe, Central Foundry Div., General Motors Corp.*

Philadelphia— More than 140 people attended the regular meeting of the AFS Chapter held April 11. Chairman H. C. Winte, Florence Pipe Foundry & Machine Co., Florence, N. J., presided.

A roundtable discussion, popular with members of the chapter, was led by Eugene Lanar, Dodge Steel Co., Philadelphia; John Juppenlatz, Quaker Alloy Casting Co., Myerstown, Pa.; H. Reitinger,

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ALUMINUM
in 12 minutes
OIL USED : 7/10 gal.

100 lbs.
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in 20 minutes
OIL USED : 1.2 gal.

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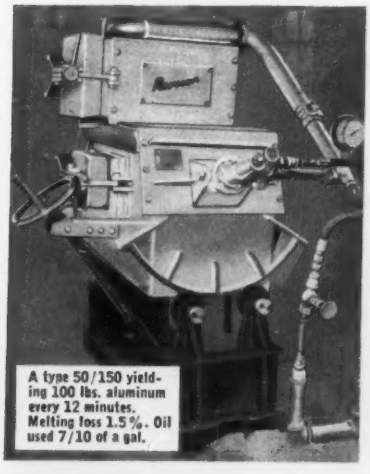

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foundry consultant, Beverly, N. J.; James Vanick, International Nickel Co., New York; Joseph Allen Jr., American Smelting & Refining Co., Newark, N. J.; and R. B. Fischer, Ingersoll-Rand Co., Phillipsburg, N. J.

Special guest at the meeting was O. J. Myers, Reichhold Chemicals Inc., White Plains, N. Y.

Nearly 100 were present at the chapter's May 9 meeting. William Thomas, executive vice president, Emmaus Foundry & Machine Co., Emmaus, Pa., was the speaker on the subject "What the Customer Wants in His Castings." His interest in the topic is based on 45 years' experience in the foundry industry and undoubtedly also stems from the fact that he is currently chairman of the Marketing Research Committee of the Gray Iron Founders' Society.—*Edward C. Klank, Philadelphia Coke Co.*

Washington— Speaker at the April 17 AFS meeting at the Engineers' Club, Seattle, was John E. Wilson, West Coast division manager for Climax Molybdenum Co. His topic was "Factors Affecting the Behavior of Steel Castings."

The chapter has established a permanent educational program directed toward the development of personnel within the various foundry organizations in the chapter area. Part I of the program was a series of five lectures on foundry metallurgy which dealt with metals and alloys, solidification of metals, physical properties, heat treatment, and metals and alloying practices. Prof. William Snyder, Department of Mechanical Engineering, University of Washington, served as instructor of the lectures. Classes were held on the University of Washington campus on Monday nights beginning April 14.

Newly elected officers to serve during the 1958-59 chapter year are: Chairman, Leon Morel Jr., Morel Foundry Corp., Seattle; vice chairman, Vernon Rowe, Ballard Pattern & Brass Foundry, Seattle; program chairman, Fred R. Young, E. A. Wilcox Co., Seattle; treasurer, Jack Uren, Firebrick Supply Co., Seattle; secretary, Frank H. Jefferson, Frank H. Jefferson Inc., Seattle.

Directors to serve three years: Hubert Rushfeldt, Atlas Foundry & Machine Co., Tacoma, Wash.; Tom O'Brube, Materials Reclamation Co., Seattle; and Everett Behrman, Olympic Foundry Co., Seattle.—*Frank H. Jefferson, Frank Jefferson Inc.*

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YOU KNOW it is false economy to buy refractory plastics if they dry out before you can use them. Foundries have solved this problem with the plastic that stays moist and usable for TWO YEARS..... **Ironton NOJOINT** in 550 pound steel drums.

YOU SAVE money when you buy in large quantity (palletized drums are available). You save freight costs on repeated small shipments. You save on day-to-day operations because **Ironton NOJOINT** does so many jobs more efficiently.

YOU CAN get **NOJOINT** out of the drum quickly and easily (we tell you how) and put it to work in ladle linings, cupola spouts, tapholes, slagholes and for patching the cupola well. While the plastic in drums or sliced in 100 pound cartons is most convenient to use, you will get excellent service also from **Ironton NOJOINT** dry in 100 pound bags if you prefer mixing it.

Ironton engineers will visit your foundry and show your men where and how to use **Ironton NOJOINT.** Write or call **today** for the latest bulletin and additional information.

SINCE 1917 THE IRONTON FIRE BRICK COMPANY
IRONTON, OHIO

1395 Ashtabula Street

Reliable Refractories

Write for name of nearest representative, or telephone Ironton 109

Circle 700 on Page 51

The Shakeout

Vibration Testing Is Automatic

ENVIRONMENTAL testing division of Bowser-Morner Testing Laboratories Inc., Dayton, Ohio, has added automatic cycling type vibration test equipment to its facilities. It consists of a high-frequency, electrodynamic vibration exciter capable of random force outputs up to 1200 lb sinusoidal force at frequencies to 2000 cps.

The equipment includes automatic cycling function plus an electronic amplifier and power supply. In addition, a vibration meter and oscillograph are used for visually indicating the vibration cycle during testing and for recording cycle results by photography. Vibration tests can be carried out at temperatures from −65 to +160° F.

For More Details Circle No. 433—Page 193

New Unit Makes Dolomite Additions

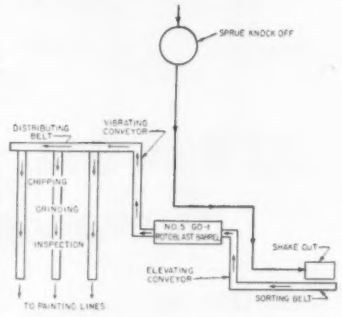
THE SPECIALLY DESIGNED dolomite machine shown here will be used by Pittsburgh Metallurgical Co., Niagara Falls, N. Y., to make additions to open-top electric arc furnaces at its Atlantic Seaboard Div. plant in Charleston, S. C.

Manufactured by Blaw-Knox Co., Pittsburgh, and first of its kind by that company, it has several features which contribute to its versatility. The hydraulic throwing mechanism, energized by the truck's power takeoff, can handle a variety of materials besides dolomite, and the mechanism can be rotated 180 degrees in either direction. It is mounted on a platform truck, and bin capacity is 40 cu ft.

For More Details Circle No. 434—Page 193

Continuous Cleaning Barrel Cuts Costs

TO MEET increasing production requirements, Milwaukee Works, Construction Equipment Div., International Harvester Co., Milwaukee, has installed a continuous blast barrel to lower cleaning costs and cope with faster production schedules. A 72-in.-diam barrel is reported to have reduced labor costs one-third and to have cut floor space requirements and maintenance.



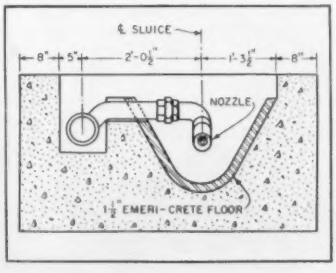
Normal foundry production of the plant is more than 400 tons of gray iron castings daily. The Continuous-Flo barrel, made by Pangborn Corp., Hagerstown, Md., currently is cleaning about 10 tons per hour, but is designed to clean up to 16 tons hourly, depending on casting size and shape. The accompanying drawing shows layout of the blasting line.

Used for large and small parts, the barrel will handle castings up to 28 in. long. Two wheels 19½ in. in diam and 5 in. wide, each powered by a 40-hp motor, throw about 100,000 lb of steel shot abrasive per hour.

For More Details Circle No. 435—Page 193

Foundry Sluiceway Withstands Abrasion

AT THE Dearborn Foundry of Ford Motor Co., Dearborn, Mich., the sluiceway (shown here in cross section) withstands abrasion from waterborne cupola slag and dust discharged at a constant pressure of 60 psi.



Several hundred lineal feet of these sluiceways, designed by Ford engineers, are in operation 16 hours daily, 5 days a week, and have given 6 years of trouble-free service.

Sluiceway surfaces are made by vigorously raking and grooving the structural base soon after it is poured and formed. Vertical and horizontal areas then are given a slush coat of portland cement and water. An Emeri-Crete mix—a low-water ratio mix of Cortland emery aggregate and portland cement—then is applied and tamped in place 1½ in. thick.

For More Details Circle No. 436—Page 193

For speed and convenience

MOROC®

the controlled silicate CO_2 binder

A GRADE FOR EVERY FOUNDRY REQUIREMENT

MOROC ❶ High-strength binder for ferrous and nonferrous molds and ladle linings.

MOROC ❷ For medium-sized and large molds and cores. Has high-strength and good collapsibility.

MOROC ❸ High-strength, high-collapsibility binder for ferrous and nonferrous cores, can be used in core blowing equipment.

MOROC ❹ Binder with extra-high collapsibility, especially well-suited for core blowing equipment.

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MOROC CORE PASTE—For joining sections of silicate bonded cores. Fast drying, gives a high-strength bond in minimum time. Supplied in 55-gal. drums, 5-gal. pails.

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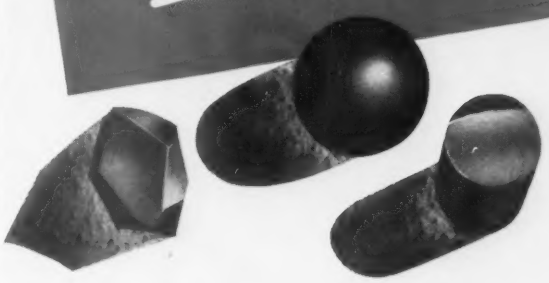
Diamond Chemicals

Circle 702 on Page 51

BLASTRITE ABRASIVES STAND UP UNDER IMPACT



The punishing impact of cleaning and peening operations calls for a metallic abrasive that can stand up and be counted.

The Blastrite line does that and more, simply because it's produced to consistently rigid specifications.

We have a small plant but we have large ideas about quality. You get guaranteed quality when you get Blastrite shot and grit.

Write for our catalog or outline your metallic abrasive requirements to our nearest representative.

Packaged the way you want it.

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Steel • Pearlitic Malleable
"A" Iron • "B"
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SPRINGVILLE 1, NEW YORK

Circle 703 on Page 51

CURE CORES

IN SECONDS— USE PURECO CO_2

Use Pureco Carbon Dioxide to cure *large or small* cores and molds.

You eliminate costly oven equipment and operation — save cost of driers — save on core handling time — save on storage space, since cores set in seconds and can be used immediately. You cut down rejects.

Your Pureco representative will be glad to arrange for a demonstration of the CO_2 process in your plant or supply you with further information at no cost or obligation to you.

Contact your nearest Pure Carbonic office today or write the address below requesting Bulletin #27.

PURECO CO_2

Pure Carbonic Company

A Division of Air Reduction Company, Incorporated

150 EAST 42ND STREET, NEW YORK 17, N. Y.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT

Circle 704 on Page 51

CENTRIFUGALLY CAST

AUTOMOBILE CYLINDER LINERS

DIESEL ENGINE LINERS

BRONZE BUSHINGS

on the new WATER-COOLED Model M-WC (Illustrated)

Utilizes low cost permanent molds of available steel tubing to produce gray machinable cast iron or bronze bushings. Water cooled molds can be maintained at either high or low temperature easily. High or limited production in very small space with unskilled labor. Completely safe for workmen. Simple, sturdy equipment. Quick changeover from one mold to another. Practically 100% metal yield of high quality, denser castings. Metal porosity eliminated.

Write for New Bulletin #257 Illustrating Model M-WC

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We have available an Experimental Foundry equipped for ferrous and non-ferrous melting for both vertical and horizontal centrifugal casting production. Our facilities are available to foundries for research or trial centrifugal castings at low cost.

Centrifugal Casting Machine Co.

P. O. Box 947 Tulsa 1, Okla.

Circle 705 on Page 51

HIGH SILICA QUARTZITE PEBBLES

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R. W. SIDLEY, INC.

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Circle 706 on Page 51

NCP makes effective PATTERN LACQUERS

1. Seals pattern to prevent moisture and water absorption.
2. Brushes easily—dries quickly.
3. Does not chip, peel, bubble, or blister, and is flexible.
4. Adds slip, promoting clean parting of pattern from sand.
5. Made in all colors.
6. Time tested material—successfully used in pattern shops all over the country for over 30 years.

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Forces blackening into pores and pockets of molds. Sprays Silica wash, oil, or water equally well. Use it also to sand blast or as a blow gun.

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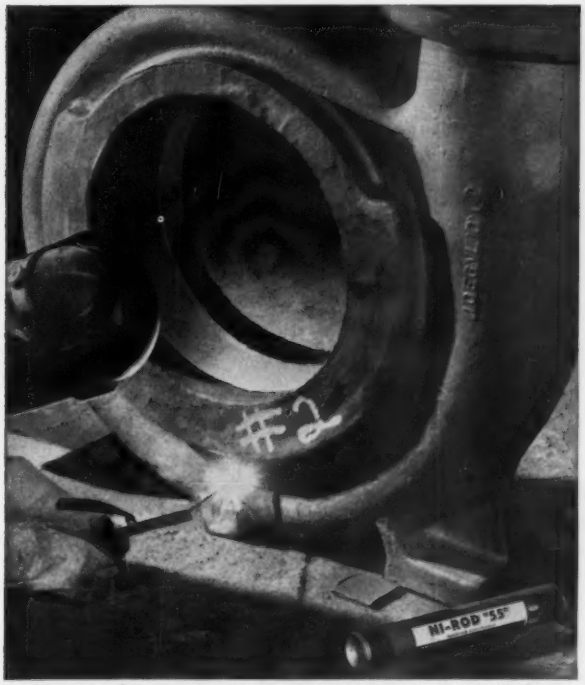
Circle 708 on Page 51



Weldor repairs pump casting at Adirondack Steel Castings, Div. of Consolidated Foundries, Watervliet, N. Y. Time — 2 hours. Material cost — $19.

Foundry gives a new face to scarred castings

This $1000 casting might have been scrapped.

It had four sand inclusions near its base. But a foundry weldor chipped out the defects and filled them with only nine pounds of Ni-Rod "55"* weld metal. All it took was $19 and part of his afternoon to *permanently repair* this 985 pound casting.

It's easy to salvage castings with Ni-Rod "55" Electrodes. Welds are sound and strong, ductile and machinable. And — they neatly match the color of most cast iron.

Rarely is preheat or post heat required.

Easy to handle Ni-Rod "55" electrodes work in all positions. A.C. or D.C., you get a smooth bead and easy slag removal. And — weld ductility resists fusion zone cracking.

"Repair Cast Irons Quickly and Easily" is an Inco booklet that shows how other foundries salvage castings, cut costs with Ni-Rod "55" electrodes. Write for your free copy today.

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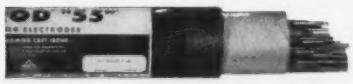

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ELECTRODES • WIRES • FLUXES

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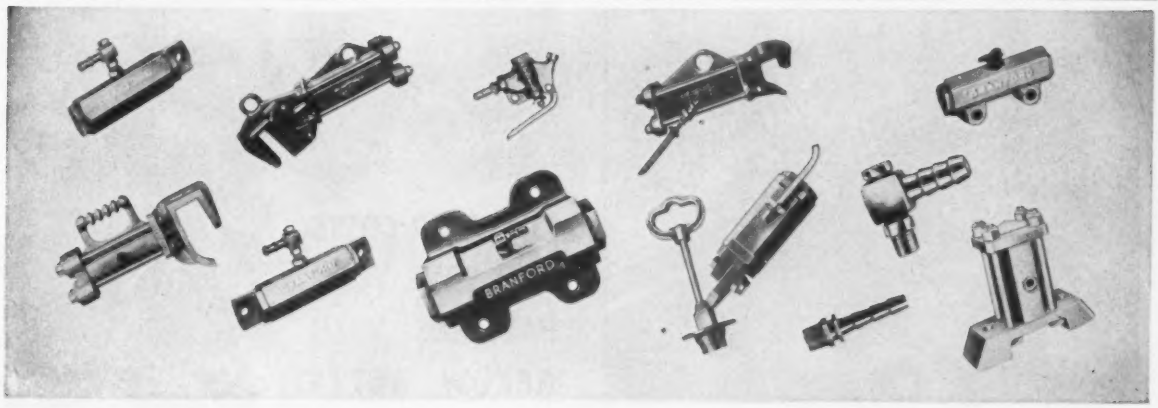

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For

CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

ROBESON PROCESS COMPANY

(Established 1905)

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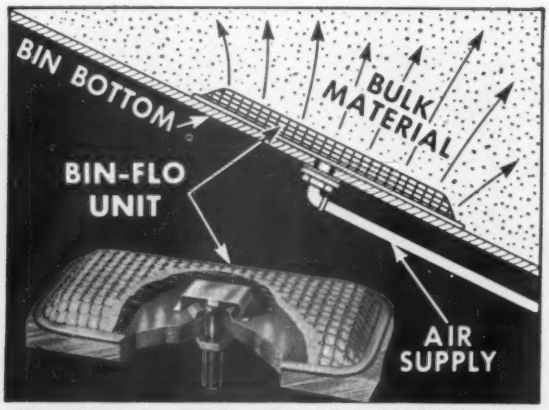

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USES SMALL VOLUME OF AIR AT LOW PRESSURE

KEEPS BULK MATERIALS MOVING

BIN-FLO units in bins, chutes, hoppers, etc., restore flow characteristics to dry, finely ground materials which tend to pack or bridge in storage. Types for all materials and conditions. No moving parts; simple installation; negligible operating cost; no maintenance cost.

BIN-DICATOR the original diaphragm-type bin level indicator. In successful use for over 20 years. **ROTO-BIN-DICATOR** new, motor-driven paddle type; excellent on bins under pressure or vacuum, and for general application. Also explosion-proof units, U.L. listed.

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Circle 712 on Page 51

Circle 713 on Page 51

No. 4 DAYTON RING VALVE BENCH RAMMER

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You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

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Manufacturers of Pneumatic Tools Since 1903

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Circle 714 on Page 51

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DURA-STIX SUPER QUALITY CEMENT, with an absence of grit, permits Fire Brick to be laid to hair-line closeness, providing an absolutely airtight joint.

Use DURA STIX on dry sand molds, as a core wash and as a protective coating on wood bottom boards. Hundreds of other uses!

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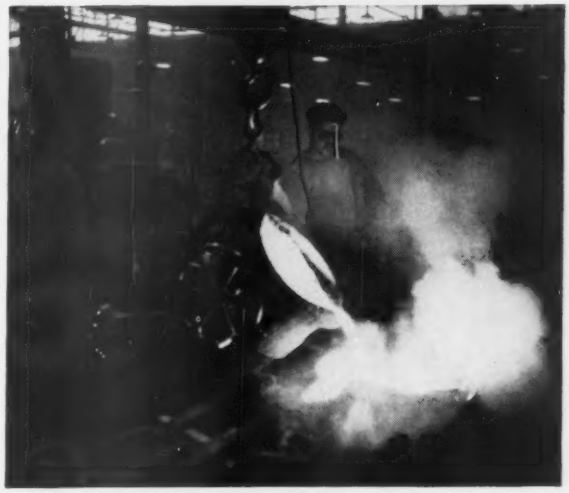
Circle 715 on Page 51

Here's the economical way to incorporate titanium in aluminum castings!



B&A® POTASSIUM TITANIUM FLUORIDE

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To Get All These Benefits:

- finer grain structure
- higher tensile strength
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Here's How:

Where temperatures are in the range of 1400°F., add the Potassium Titanium Fluoride straight. If operating temperatures are lower, use a mixture of this salt with B&A Potassium Fluoborate.

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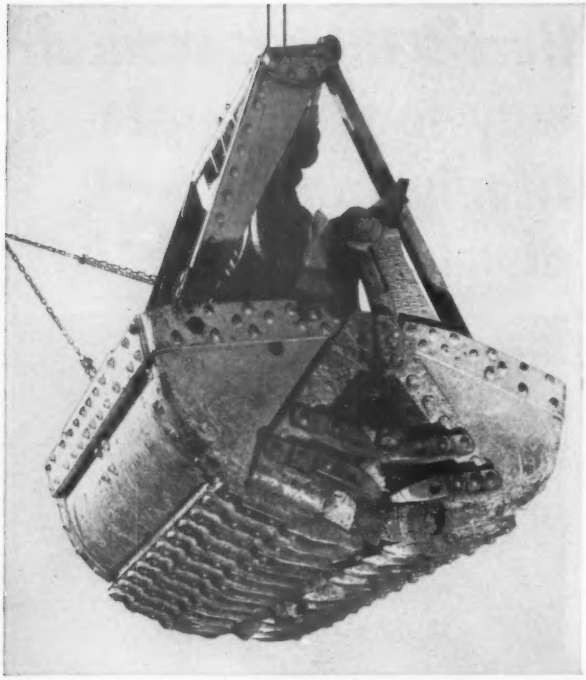
Circle 716 on Page 51



Blaw-Knox "Shark-Tooth" Foundry Buckets handle coke with minimum degradation!

Here is the bucket chosen by experienced Foundrymen. Designed and built to the specific requirements of Foundry operation, Blaw-Knox "shark-tooth" Buckets literally finger their way through coke, handle it with minimum degradation.

With quickly-attached liner plates, this versatile performer handles sand or other granular material without leakage. It's quick hook-on feature means that your crane is easily available for other Foundry Services.

An experienced Bucket engineer will be glad to study your operation, help you select the proper size, type and weight of Bucket for your operating conditions.

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Blaw-Knox Equipment Division
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WRITE TODAY! You can get valuable engineering information on how to get improved Foundry operation with the help of Blaw-Knox Foundry Buckets. Ask for a free copy of Bulletin 2232-R.

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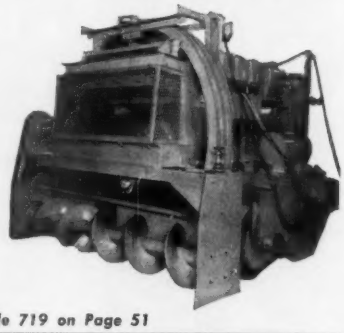

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"THAT GOOD" FOUNDRY COKE

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Exclusive characteristics of **RUDOW STRAINER CORES** makes it possible for you to substantially cut your costs. Moreover, our prices can compete whether you have a supplier, or make your own strainer cores.

RUDOW STRAINER CORES now make it economically wise to convert your present complex gating jobs to the simplified use of our strainer cores.

Prove to your satisfaction that **RUDOW STRAINER CORES** will reduce reject losses and keep castings free of oxides, slag, and other impurities by controlling the flow of metal into the mold.

We invite you to prove our claim by allowing us to furnish free samples of **RUDOW STRAINER CORES**

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HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST
because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS
because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES
chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

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SALES • SERVICE • STOCK • COAST TO COAST

Circle 722 on Page 51

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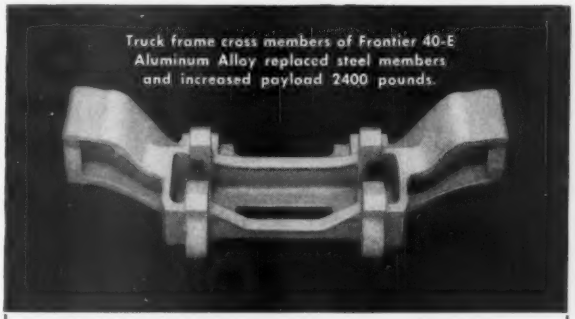
when you sell **FRONTIER 40-E** Aluminum Alloy CASTINGS!



Sell Castings
ENGINEERED TO THE JOB—
Sell Customer Service

When customers ask for light weight castings, don't just think of aluminum. Do a selling job. Ask about strength requirements. Would shock resistance be an advantage? How about corrosion resistance? Must the casting withstand high pressure? Talk about weldability and machinability.

Then recommend Frontier 40-E, the self aging, high strength aluminum alloy that has all these desirable features. Being a primary ingot, it is more reliable and can be counted on to give the same results day after day — year after year.

Do more than offer just another casting. Get out of the rut. Offer better castings with better design factors — castings made of Frontier 40-E — formulated to give 25,000 lb. yield strength. We'll back you up with our complete engineering and laboratory service. We'll start you on the road to *more and better* casting business.

Write for complete information today.

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Exclusive Foreign Producers of 40-E
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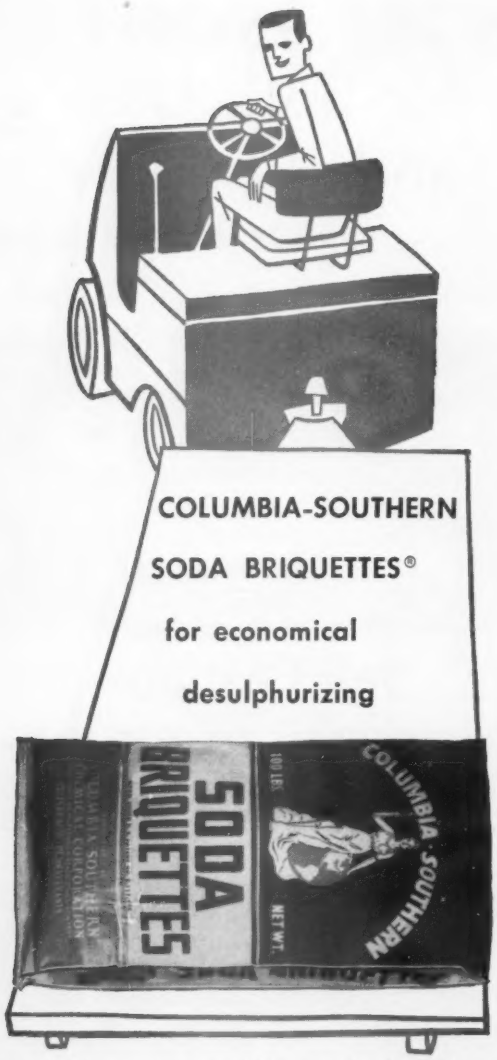
Circle 723 on Page 51



Time and labor are important factors in desulphurizing and cleansing iron as is true in every other Blast Furnace and Foundry operation.

Columbia-Southern Soda Briquettes act fast because their pellet shape, about the size of a walnut, exposes a maximum of surface area for contact with the iron. With fewer man-hours required, production can be accelerated while labor costs are actually reduced.

There are no dusting losses with these briquettes. Working conditions are improved and waste is eliminated. They always hit the mark. You can always depend on fast, efficient results.

Order your supply today by name "Columbia-Southern Soda Briquettes." Packed in 100 lb. paper bags, they are easy to handle, easy to store, and easy to transport.

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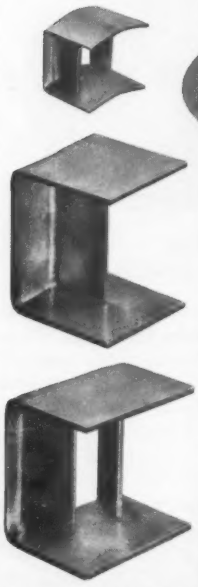
IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division

Circle 724 on Page 51

WHY POUR YOUR PROFITS AWAY?
save up to 50% on chaplets



Buffalo
ECONOMY CHAPLETS

Now you can save up to 50% on chaplet costs with Buffalo Patented Angle Stem and Double Angle Chaplets. They burn in more easily, without chilling. They are thoroughly coated to assure instant fusion with molten metal. And the unusual strength of the one-piece design permits fabrication in thinner gauges. All these features mean *savings to you.*

Furnished in a complete line of sizes and gauges, Buffalo Economy Chaplets are available in tinned steel, Monel, stainless steel and copper. Why not give them a trial? It costs only pennies to find out how many dollars you will save.

Write for literature on Economy Chaplets. For information on the complete "Buffalo" line, request Catalog No. 20.

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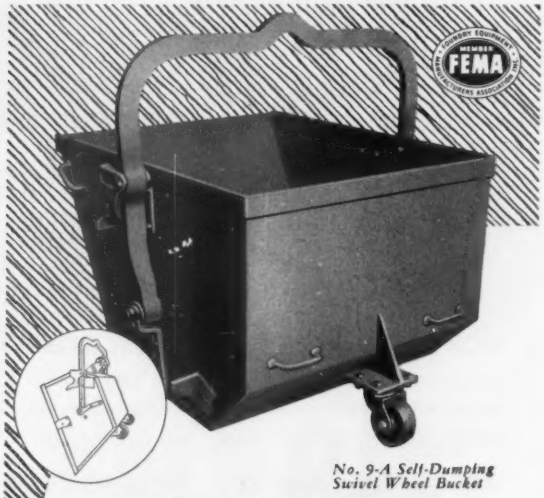
211 Chandler St., Buffalo 7, N. Y.

Circle 725 on Page 51



No. 9-A Self-Dumping Swivel Wheel Bucket

PENN BUCKETS...

Careful balancing makes Penn Buckets self-dumping when loaded and self-righting when empty. Welded construction prevents "clinging", makes them empty easily and completely. The swivel wheel increases handling efficiency, too.

WRITE TODAY FOR NEW BULLETIN AND DIMENSION SHEET

PENN IRON WORKS, INC.
READING, PENNA.

Circle 726 on Page 51

CLASSIFIED ADVERTISING

Help Wanted

ESTIMATOR-ENGINEER

Prepare cost estimates from blueprints and standard data for wide variety of Aluminum Sand Castings for bidding purposes.

High degree of interest in mechanics with some experience in machine and/or tool design desired, since estimator also assists in design of pattern equipment for production.

A good position with a company established in 1875.

Write:

OBERDORFER FOUNDRIES, INC.
c/o PERSONNEL DIRECTOR
SYRACUSE, NEW YORK

FOUNDRY SUPERVISOR

Young man with technical education and general experience with small alloy and stainless steel castings to eventually take complete charge of a small, new operation in New England.

BOX 130, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY METALLURGIST

B.S. degree with 2 to 5 years experience with nonferrous foundry making precision type castings desirable but not essential. Duties would include supervision of short range development projects and trouble shooting on plant process and metallurgical problems. Salary open. Send resume to: PLANT MANAGER, ARWOOD PRECISION CASTING CORPORATION, TILTON, N. H.

JOBBING STEEL FOUNDRY—PRODUCTION MANAGER

A Production Manager is needed to assume responsibility for all production. Man wanted is heavy in technical background to complement existing staff of practical and experienced personnel. Send full resume of qualifications and history. All replies will be given confidential review. Address: Box 128, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GENERAL FOUNDRY FOREMAN

For mechanized ferrous foundry in Midwest. Must be experienced in gating. Have knowledge of Standard Costs. Supervise all molding operations. Submit confidential resume. Address: Box 118, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Good opportunity for capable and energetic steel foundry superintendent for medium-sized steel foundry. Must be aggressive and understand thoroughly steel foundry jobbing operations. Must be cost conscious and capable of getting the most out of his foremen and men. Foundry is located in the middle west. Submit resume immediately. Address: Box 995, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SHELL SUPERINTENDENT

Midwest gray iron foundry has opening for superintendent of shell molding and shell coremaking department. Please send resume of experience and qualifications. All replies will be held in strict confidence. Address: Box 126, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLEANING AND GRINDING FOREMAN

A progressive gray iron jobbing foundry located in the middle west has an opening for a foreman in the Cleaning and Grinding Department. All replies confidential. Address: Box 127, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

ASSISTANT SUPERINTENDENT FOUNDRY ENGINEER

Graduate Engineer, age 27, now employed as supervisor-engineer, desire responsible position with progressive ferrous or nonferrous foundry with opportunity. Have experience in all phases Meehanite jobbing foundry including operations and administrative controls, practical and technical. Will relocate. Address: Box 117, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

Thirty-three year old graduate of General Motors Institute cooperative engineering program with 13 years' experience in metal casting field, including automotive gray iron, university instructing, technical writing, and pit molding job shop. Will consider any position related to the foundry industry that offers opportunity as well as challenge. For resume Address: Box 132, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES-SERVICE ENGINEERING

Industrial Engineer, 12 years associated with foundry industry, desire opportunity in casting sales or sales-service of ideas, equipment or supplies to foundries. Address: Box 133, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Sixteen years' experience, quality control of cupola castings for jobbing and heavy machinery shops. Also experienced in sand control and laboratory. Age 47. Available, will relocate. Address: Box 124, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

RECESSION CASUALTY—MUST RELOCATE

Foundry specialist with national reputation—M.S. Metallurgical, B.S. Mechanical Engineering. Experienced in ferrous and nonferrous, trouble shooting, research, product planning, marketing, production, and management. Position must be high calibre. Will consider partnership. Address: Box 125, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PLANT MANAGER

Experience in estimating, production control, plant layout, union negotiations, supervision, metallurgy, inspection. All phases production aluminum and ferrous investment castings. Also supervised machine shop. Desire Southern California area. Address: Box 123, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Thorough knowledge all steel foundry operations, production or jobbing. Age 40; 23 years' experience, molder by trade, 14 years on supervision, from foreman to superintendent in complete charge of all operations. Now employed in above capacity, going to make a change. Address: Box 121, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY WORKS MANAGER

Have complete knowledge of all gray iron operations. Want position with a free hand to attain maximum results. Mechanized or one that plans to modernize. If you have such need, I am your man. Address: Box 110, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER-SUPERINTENDENT

Thorough knowledge of all phases of foundry operations and administrative functions. Desire opportunity where challenge exists. Age 39. Address: Box 119, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

DISTRICT SALES MANAGER AVAILABLE

Cleveland, Northern Ohio, East. Good organizer accustomed to dealing with top level management. Excellent contacts. Proven record of casting sales and sales development. Will consider agency representation. Address: Box 108, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Young foundryman thoroughly versed in all gray iron operations. Degree in Metallurgical Engineering. Interested in responsible position with opportunity. Address: Box 105, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

FOUNDRY SUPERINTENDENT

Thorough knowledge of all phases of nonferrous metals. Understand gating, jobbing, floor, machine and plumber supplies. Can also produce pressure tight and porous free castings. Know sand control and core room work. Address: Box 116, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CORE ROOM FOREMAN

Thirty-eight years old, 19 years' experience in core room, 12 years as a supervisor in iron and steel jobbing foundries. Address: Box 129, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 996, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN

Age 34, fifteen years' foundry experience, three years as Meehanite supervisor. Know all operations of iron and steel foundries, production or jobbing shop. Fully qualified journeyman. Desire position with a future. Address: Box 113, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Practical and technical, 30 years' experience jobbing and production. Familiar with every phase of the foundry. Now employed. Address: Box 104, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

TRAINED STEELMOLDER

German, living in Canada, age 22, with six years in various types of steel molding, seeking new connection. Willing to locate anywhere. Address: Box 114, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLEANING ROOM FOREMAN

With 25 years' experience processing castings of all kinds. Free to relocate. Address: Box 122, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER

Young metallurgical engineer with fourteen years' foundry experience. Superintendent for the last four years. Interested in responsible position with opportunity. Address: Box 135, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Gray iron, heavy class jobbing preferred. Locate in New England, New York or Pennsylvania only. Address: Box 134, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundry Consultants

CONSULTING ENGINEER
Thirty-five years' Experience
Acid and Basic Practice

Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing, and organizing of your melt shop.

EUGENE H. WEAK 2933 HIGHWAY AVE.
HIGHLAND, IND. PHONE: TEMPLE 8-1244

TROUBLE SHOOTING—INVESTIGATIONS CONSULTING

For small or large gray iron foundries on weekly or monthly basis by unattached, impartial and cost minded technical foundry engineer and metallurgist with over 30 years' experience here and abroad. Address: ERIC WISBRUN, 109 W. MULBERRY ST., ALBION, MICHIGAN.

FOUNDRY CONSULTANT—NONFERROUS

Sand — permanent mold — centrifugal permanent mold — and centrifuge permanent mold. High pressure castings a specialty. Address: ED JENKINS, RT. #3, BOX 345, WALKERTON, INDIANA, PHONE: 712W.

HAVE YOU EVER NOTICED

the many types of headings under which classified ads are listed? There's one for every want—if you want to obtain qualified personnel, want to sell used machinery, want to buy equipment, or want a better position, you should advertise in the classified section of FOUNDRY.

FOUNDRY has 75,000 readers. They represent a readership which covers the entire foundry industry. What does this mean to a classified advertiser? It means that for a nominal sum you get the widest possible coverage of the industry. Your message reaches "just the right people".

classified
advertising dept.
Foundry ★
Cleveland 13, O.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of
GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS

Confidential Inquiries Invited
From Employers and Qualified Applicants

For Fast Competent Assistance Contact
DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

Opportunity

PERMANENT MOLD METHOD AVAILABLE

THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and non-ferrous metals and invites inquiries from any country regarding this method and process.

Wanted-To-Buy

WANTED

#3161-16 or 3161-20 Osborn Roto-Lift Machine. Must be in good condition.

BOX 112, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MOLDING MACHINES WANTED
One Milwaukee jolt-squeeze stripper, Model 216 also one Osborn Roto-Lift Model 3161. Address: Box 115, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FURNACE WANTED
One used Electric Arc Melting Furnace (11 to 13 ton charge), 11' diameter shell, basic—with or without furnace transformer. Address: Box 101, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MIXER WANTED
Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED
2", 3", 4" and 12" extra heavy soil pipe fittings patterns. Address: Box 991, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SHOTBLAST MACHINE WANTED
6 ft. "LF-14" Pangborn Airless Rotoblast Table or equal. Address: SOUTHERN CASTING COMPANY, SEVIERVILLE, TENNESSEE.

Foundries For Sale

FOUNDRY FOR SALE OR LEASE

Pressure cast matchplate aluminum foundry and pattern shop in Metropolitan New York area. Now active with nine employees. Sufficiently equipped to produce 50 plates a week. Low price and rent. Good opportunity.

BOX 131, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY FOR SALE
Soil pipe fitting foundry. All aluminum patterns and flasks. Plenty of room for expansion. Molding shop 10,000 square feet. Plus pattern shop, cleaning room, storage room. Number Seven Whiting Cupola, with skip loader. Established business. Lack operating capital. Address: BARBER'S IRON FOUNDRY, TIMBER ROAD, BRIDGETON, NEW JERSEY.

FOR SALE OR LEASE
Cast iron foundry, Western Kansas. Well established. More business than can handle. Immediate possession. Write or call: J. S. REED, COLBY, KANSAS.

Foundry Wanted

FOUNDRY WANTED
Buy or lease operating iron foundry to produce jobbing casting of premium quality gray, nodular and special service, high duty irons. Address: Box 120, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

FOR SALE
Simpson No. 1 Muller
Simpson No. 1½ Muller
Simpson No. 2 Muller with loader
American Tumblast, 27 x 36 with loader
American Tumblast, 36 x 42
Fisher Furnaces #600 MNP
Coulter Furnaces #400 MNP
Osborn #405 Rollovers
Elevators
Belt Conveyors
Shakeouts
Milwaukee 165 Pin Lift
International Rollover RES
Milwaukee 163 Jolt Stripper
Champion J8L 12 Pin lift, jolt
Osborn 710J, pin lift
Osborn 212J, Jolt Squeeze
Osborn 275J, Jolt Squeeze
Osborn 276J, Jolt Squeeze
International LJS, Jolt Squeeze
International PJS, Jolt Squeeze
Milwaukee 104 Jolt Squeeze
Champion JS 108 Jolt Squeeze
Arcade 100S Jolt Squeeze
Spo 110 Jolt Squeeze
Davenport Rollover 28 SA
International Rollover 30 x 8 portable
International Rollover 2410 G portable
International Rollover 30 x 8 no jolt
Tabor rollover 30 x 40 portable
J & J 610 B rollover portable
International pin lift
Davenport pin lifts
Osborn 559 pin lift
Spo 506 jolt rollover, pin lift, draw
Nichols plain molding machine, high speed
International plain jolt, 36 x 45 table
International Type R core rollover, hand
Swing Grinders
Royer sand preparators
Simplicity preparators
B & P preparators
Blystone sand mixers
Coleman core ovens
Porbeck core ovens
Grinders ½ hp to 25 hp
Disc grinders
Ladles from 50 lb. to 10,000 lb.
Pouring Devices 500 lb. to 2000 lb.
Gyratory riddles
Monorail and bridges
Air Hoists 250 lb. to 10,000 lb.
Overhead chain conveyor #458, track, drives, etc.
Blowers-Centrifugal-positive-exhaust
Dust collectors all sizes

FLASKS
ALUMINUM
SLIP and POP
Sizes from 10" x 10" to 48" x 48"
JACKETS
Aluminum and Iron
STEEL FLASKS
Sizes from 10" x 15" to 9' x 9'
CORE PLATES
Transite —— Iron —— Aluminum

MANY OTHER ITEMS IN STOCK
SEND US YOUR INQUIRIES
WE BUY — SELL — TRADE
THE HOMAN MACHINERY CO.
710 E. FRONT ST. MAIN 10339
CINCINNATI 2, OHIO

CLASSIFIED ADVERTISING

For Sale

SAND BLAST EQUIPMENT
SELL-BUY-TRADE
GUARANTEED MACHINES
TERMS: 3 YEARS TO PAY

8' LF-14 Pangborn Table	$2000.00
4' LG-14 Pangborn Table	2200.00
9' LG-14 Pangborn Table	4500.00
6' LG-14 Pangborn Table	2500.00
Pangborn 8 x 10 Room	2800.00
Pangborn 53 EN2 Hand cabinet	325.00
Pangborn Auto Peening cabinet	1100.00
48 x 48 Wheelabrator Tum. w/loader	4000.00
42 x 48 Wheelabrator Tum. w/loader	2500.00
27 x 36 Wheelabrator Tum. w/loader	2250.00
4' American Multi-Table	2500.00
15 x 20 Wheelabrator Tum.	1500.00
15" Continuous Wheelabrator Tumblast	1000.00
8' Wheelabrator Table Blast	2000.00
14 LG5 Pangborn Rotoblast Multi-Table w/5—5' tables	9000.00
Pressure Tanks, all types	150.00 up
Vapor Blast cabinets	400.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES, INC.
5654 W. Jefferson
Detroit 9, Michigan
VI-36750

FOR SALE

All of our foundry equipment, including two electric furnaces, cupolas, compressors, Wheelabrators, Surface Combustion box type oven, core ovens, molding machines, casting bins, in fact our complete foundry.

MEMPHIS CASTING WORKS, INC.
1006 OAKLAND AVENUE
MEMPHIS 1, TENNESSEE

FOR SALE

One Shalco two station shell molding machine, complete. Model CO-1, Serial #80, never used. Best Offer.

CURTO-LIGONIER FOUNDRY CO.
1215 N. 31ST AVENUE
MELROSE PARK, ILLINOIS

CUPOLAS FOR SALE

J. W. Paxon #9 with 72" shell diameter. Also Whiting size 3½. Make offer. Address: BERGEN MACHINE & TOOL CO., 189 FRANKLIN AVE., NUTLEY, NEW JERSEY.

For Sale

CLEARANCE! SUPER SPECIALS!

$295.00 Each

213 SPO Jolt, Squeeze, Strip Molding Machine
2114 SPO Jolt, Squeeze, Strip Molding Machine
2136 SPO Jolt, Squeeze, Strip Molding Machine
720 U Osborn Jolt, Squeeze Strip
275J Osborn Jolt Squeezers
601-602-602 Osborn Rollovers
193 Osborn Core Blower
94 Osborn Core Blower
SB-11 International Core Blower
#42 Osborn Hand Rollover
54" Gardner Horizontal Disc Grinder
BUDA Fork Lift Truck — Model FT 75-24 C Ser. 9159075 — 1956 machine — 7500 lb. cap. Propane Gas $2995.00

FOR THE BEST DEAL CALL
BALCHER MACHINERY COMPANY
695 E. 152nd STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

FOR SALE
MOTORS—GENERATORS
TRANSFORMERS
Unused—Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone station Collect GLenwood 3-6783
P. O. Box 51—Rochester 1, New York

FOR SALE

Two (2) Newaygo "Handy Sandys" Model HS-7-G. This equipment was used only a few weeks and is a real buy.

PERU FOUNDRY COMPANY
PERU, INDIANA

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

FOR SALE

National Screening and Magnetic Separator Unit with 3 HP motor, excellent condition, also Sinder Box Car Loader with 3 HP motor, good condition. Address: CLIMAX CORP., BATAVIA, NEW YORK.

FOR SALE

REDA FURNACE, 550 series, electrical screw tilt, gas fired, completely lined ready for use. Condition as new. Address: PRECISION MANUFACTURING COMPANY, PLANO, TEXAS.

For Sale

FOR SALE

1—Simpson #0 Muller—Style M (never used).
1—Lancaster Stainless Steel Counter-Current Batch Mixer, Type LW-62.
1—Lancaster Mixer, Model EBG-4.
1—Lancaster Mixer, Model EAG-3.
1—Ingersoll Rand Air Compressor, Type PRE-2, 24" x 16", 100# pressure with 300 HP motor.
3—Link Belt Roto-Louver Rotary Dryers, Models: 207-10; 310-16 and 502-20.

R. GELB & SONS, INC.
U. S. HIGHWAY 22, RAHWAY VALLEY R.R.
UNION, NEW JERSEY

FOR SALE

P & H 3-TON BRIDGE CRANE

Two motor, single I beam, top running, floor controlled Travlift crane, 27'2" center to center runway span. Speeds: hoist 24 fpm, 5 HP; trolley hand geared; bridge 175 fpm, 3 HP; 5 speed manual pushbutton control with time delay relays on last two steps of acceleration; runways 12'-9¼" above floor line, 69'-2" long. Price $2500.00.

ELECTRO-ALLOYS DIVISION
TAYLOR ST. & ABBE ROAD
ELYRIA, OHIO

FOR SALE

1—#4 J. C. Stroman Reverberatory Furnace—Gas Fired.

CONTINENTAL FOUNDRIES, INC.
ALBERT LEA, MINNESOTA
PHONE: 6487

FOR SALE

Molding Machine—SPO 213S Jolt Squeeze Stripper completely overhauled, excellent condition. Serial 286, table 21 x 30. Address: SMITH SYSTEM MFG. CO., 212 ONTARIO STREET, S.E., MINNEAPOLIS 14, MINNESOTA.

Die Casting Equipment

4—800 TON LAKE ERIE, 9 pound shot, HYDRAULIC Aluminum die casting machines, 58" x 89" plates, 30" max., die space, 500 pound Stroman pot type furnaces, LATE TYPE, complete with hydraulic units, accumulators and all controls.

1—800 TON LAKE ERIE, same as above except 2500 pound Stroman double dip-out furnace.

1—300 TON LAKE ERIE, 4½ pound shot HYDRAULIC Aluminum die casting machine, 36" x 36" plates, 30" max., die space, Stroman 500# pot type furnace, LATE TYPE complete with hydraulic unit, accumulator and all controls.

1000# STROMAN Double Chamber, double dip-out, gas fired, Aluminum melting furnace LATE TYPE with complete controls.

2—INGERSOLL RAND 9" x 13" SYNCHRONOUS Single Stage Air Compressors, 230 PSI direct connected 125 HP, 220/440 v., complete with M.G., forced feed lubrication, aftercooler, receiver, control panel and controls. NEW 1949 and 1950.

1—WORTHINGTON 9¼" x 13" SYNCHRONOUS Single Stage Air Compressor, 230 PSI, direct connected 125 HP, 440 v., complete with control panel, motor generator, forced feed lubrication aftercooler, receiver and controls S/N L163748.

2—15 TON DENNISON Hydraulic Trimming Presses, LATE.

PRICED RIGHT BEFORE REMOVAL FROM PRESENT LOCATION.

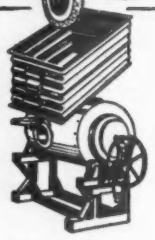
ACME

ACME EQUIPMENT CO., INC.
We will buy for cash a single piece of equipment or your entire plant
126 South Clinton Street • Phone: ANdover 3-3430 • Chicago 6, Illinois

MONA

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD — CLEVELAND 10, OHIO



OSBORN ROLLOVERS:
4—405, 18″ draw, air clamps, 3500# cap.

WHEELABRATORS
1—27″ x 36″, 5 cu. ft. Tumblast, w/loader
1—36″ x 42″, 11½ cu. ft. Tumblast, w/loader
1—42″ x 48″, 17½ cu. ft. Tumblast, w/loader
1—36″ x 42″ air blast Wheelabrator

PANGBORN
1—18 cu. ft. Rotoblast Master, w/loader

SAND SLINGERS
1—B-P Riddle type, 19″ head, 4″ tip
1—B-P Motive Jr., 19″ head, 4″ tip
1—B-P double belt, 19″ head, 4″ tip

SWING GRINDERS
10—10 H.P. Mummert-Dixon Model 1814
3—25 H.P. Safety Grinding Wheel Model 204

ELECTRIC FURNACES:
1—80 lbs. Detroit Rocking
1—350 lbs. Detroit Rocking

ASK FOR OUR COMPLETE LISTING — GLENVILLE 1-1222

Circle 907 on Page 51

CLASSIFIED ADVERTISING RATES

(Effective July 1, 1956)

POSITION WANTED—Minimum advertisement set solid, 30 words or less, $3.50. Additional words 15c each.

ALL OTHERS — "Help Wanted" — "For Sale" — "Wanted-To-Buy", etc., minimum advertisement set solid, 30 words or less, $8.00. Additional words 30c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 8 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

Single Column 2¼″ Wide	One Time	Three Times	Six Times	Nine Times	Twelve Times
1 inch	$ 22.20	$ 21.00	$ 19.80	$ 19.20	$ 18.60
2 inches	43.20	40.80	38.40	37.20	36.00
3 inches	63.00	59.40	55.80	54.00	52.20
4 inches	81.60	76.80	72.00	69.60	67.20
5 inches	99.00	93.00	87.00	84.00	81.00
6 inches	115.20	108.00	100.80	97.20	93.60
7 inches	130.20	121.80	113.40	109.20	105.00
8 inches	144.00	134.40	124.80	120.00	115.20
9 inches	156.60	145.80	135.00	129.60	124.20
10 inches (1 col.)	168.00	156.00	144.00	138.00	132.00
15 inches (½ page)	243.00	225.00	207.00	198.00	189.00
20 inches (2 cols.)	312.00	288.00	264.00	252.00	240.00
30 inches (full page) ..	450.00	414.00	378.00	360.00	342.00

Remittance should accompany advertisement when submitted —Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

PENTON BUILDING • CLEVELAND 13, OHIO

THE ACME BARGAIN PAGE

AIR COMPRESSORS
2—INGERSOLL RAND 450 cfm., 100 hp., 220-440 V.

BELTING
29" x 180' 24" x 152'
24" x 263' 24" x 120'

BLOWERS
GE 10500 cfm., 20 oz., 85 hp., 220 V.
GE 7500 cfm., 20 oz., 89.6 hp., 220-440 V.
GE Centrifugal 6200 cfm, 24 oz., 58 hp. motor
INGERSOLL-RAND 10,000 cfm, 32 oz. 150 hp. 220 V.
INGERSOLL-RAND 4000 cfm., 60 oz., 100/25 hp., 220-440 V.
SPENCER 2250 cfm., 16 oz., 15 hp., 220 V.
SPENCER 2850 cfm., 16 oz., 20 hp., 220-440 V.
SPENCER 270 cfm., 8 oz., 3 hp., 220-440 V.

CONVEYOR OVERHEAD CHAIN
1700' JERVIS B WEBB and LINK-BELT #678 with trolleys 36" centers. 2-5 hp. Variable speed caterpillar drives, & motor generator set, takeups and turns.

CONVEYOR
36" x 162' LINK BELT Oscillating Pan 10 hp., 220-440 V.
36" x 53' LINK BELT Oscillating pan.
17' BARBER GREEN Bucket Conveyor.
30" x 25' Magnetic Belt Conveyor w/drives, 2 hp., 220-440 V.
18" x 10' Steel Apron Conveyor w/drives, 3 hp., 220-440 V.
16" x 120' Rubber Belt w/drives.

CORE BLOWERS
REDFORD #2 up to 5# cores
REDFORD Bench types, horizontal or vertical clamping
2—CB15 up to 55# cores, Universal blow plate
C.B. 10 up to 12# cores, 4½" draw.
DEMMLER #4 up to 250# cores.
DEMMLER #3 up to 35# cores.
INTERNATIONAL SB15H, up to 150# cores, Hydraulic clamp and draw
INTERNATIONAL SB 13, up to 60# cores
INTERNATIONAL SB 12, medium sized cores
INTERNATIONAL SB 11, medium sized cores
6—OSBORN 193 up to 50# cores
OSBORN 2035-2 large sized cores

CORE GRINDERS
7—MILWAUKEE 70-9 & 70-12s
1—OWOSSO DE1-303 42" table

CORE OVENS TOWER
COLEMAN Vertical-Horizontal 9000# per hour
COLEMAN Vertical-Horizontal 6800# per hour

CORE PASTE OVENS
COLEMAN 28' Horizontal

CORE ROLLOVERS
INTERNATIONAL REDP Rollover 12" draw

CRANES
P&H 5 TON Electric Traveling DC motors 50' span
P&H 3 TON Electric Traveling DC motors 50' span
270' Crane Runway and Supports
10 Ton AMERICAN Railmaster Low headroom floor control
10 Ton SHAW BOX electric hoist

CUPOLA GUNS
2—BONDACTOR #1250
BONDACTOR #1000

DUST COLLECTOR
PARSONS 40,000 cfm. cloth bag type

ELECTRIC MELTING FURNACES
SWINDELL 9' Dia. Top Charge cap. 3 ton steel 5 ton iron per hour, 3500 KVA 13800 volt transformer, complete in place
1—"LECTROMELT" 2 TON Size Q 4000# per hour 1500 KVA 13200 Volt
1—"LECTROMELT" Size S 1000# per hour, 500 KVA 7200 volt
LECTROMELT 500#, Size T, 300-375 KVA 2300 V primary, Moore controls, G.E. circuit breaker.

ELECTRIC MELTING FURNACES
SINGLE PHASE
1—DETROIT "LFA" 350# shell 13200 V
1—DETROIT "LFC" 700# & 350# Tapered Shell 2300 V
2—DETROIT "LFC" 350# Tapered shell 7200V

FURNACE TRANSFORMERS
1—"LECTROMELT" 800 KVA, 12000 V., 3 phase
1—WESTINGHOUSE 2500 KVA, 11200 V., 3 phase
1—WESTINGHOUSE 2500 KVA, 13800 V., 3 phase

FURNACES NONFERROUS
CAMPBELL HAUSFELD Staty, pot type
1—HEVI-DUTY HD-181-S Pot type Electric
2—400# FISHER Gas Fired Tilting Furnaces
4—600# FISHER Gas Fired Tilting Furnaces
1—600# FISHER Gas Fired Stationary Furnace
FISHER RB100 gas fired crucible
3—CAMPBELL HAUSFELD gas fired 625# brass hand tilt

GRINDERS, SNAG
FOX 24" x 2" Single Wheel 10 hp.
2—HAMMOND 20" DE 10WR1 10 hp., 220-440 V.
1—HAMMOND 20" DE Porter Cable backstands 10 hp.
1—HAMMOND 24" x 2" x 12" 7½ hp., 220 V.
HAMMOND WR-2, 2 speed, 30" x 3" wheel

GRINDERS, SWING FRAME
MARSCHKE 24" x 3" x 12" 20 hp., 220 V.
U.S. 24" x 3" x 12" 15 hp., 220-440 V.
U.S. 20" x 2½" x 6" 10 hp., 220-440 V.
2—MARSCHKE 3 hp., 12" wheel
1—B&D 7½ h.p.

GRINDERS, MISC.
PORTER CABLE BG8 Wet-Dry Belt
U.S. #70 Combination 20" disc and 20" x 3" x 1½" wheel

HEAT TREATING FURNACES
HOLDEN #202 Electrode Type, Bright hardening annealing 1850°
DESPATCH DT36 Pit type 42" x 40" Electric

HOISTS
YALE 5 TON floor control power travel
SHAW BOX 5 TON floor control Hand travel
4—INGERSOLL-RAND Air trolleys
1—500# INGERSOLL RAND LC-4
4—CLEVELAND 2000# Cab type hot metal carriers

LADLES
1—6000# Industrial Enclosed Geared Crane
1—5000# Modern Enclosed Geared Crane
3—2125# Industrial Enclosed Geared Crane

LADLE MIXING
4000# Industrial, Insulated

MOLD BLOWER
TACCONE TD4 24" x 32" flask

MOLDING MACHINES
JOLT SQUEEZE PIN LIFT
3—#165-6B MILWAUKEE TABLE, 24" x 30"—10" cyl.
2—#125-3 MILWAUKEE TABLE, 21" x 27"—12" cyl.
7—OSBORN 712 PJ, 18" x 21" Table
1—CHAMPION JSL10P 18" x 21" table 6" draw.
2—#2114 G. SPO TABLE, 26" x 27"—11" cyl.

JOLT SQUEEZERS
2—INTERNATIONAL, LJS12 16" x 20" table
1—SPO, 110J Portable 17" x 20" table
4—CHAMPION, JS10P 18" x 21" table
2—OSBORN 275PJ

JOLT ROLLOVER DRAWS
1020 JOHNSTON & JENNINGS, 60" x 50" table
JOHNSTON & JENNINGS 918, 44" x 64" table, 20" draw, rollout table
2—750# HERMAN 20" x 30" table
20 x 8" INTERNATIONAL type G, 20" x 30" table
2—INTERNATIONAL RJ 20 x 12"
DAVENPORT 28A, 1500#, 29" x 40" Table

JOLT PIN LIFTS
2—INTERNATIONAL 1200—S 26" x 27" table, 3" draw

PIN LIFT PUSHOFF
CHAMPION 28" x 42" table
MILWAUKEE 620ND 20" x 24" table

MULLERS and MIXERS
1—#2 SIMPSON Unit Drive
2—#1 SIMPSON Mullers

SAND CUTTERS
1—ROYER MCZ-43

SAND SLINGERS
2—B&P Tractor 19" heads
B&P 2 speed 40/25 HP double belt
B&P Plate Feeder, 5 ton

SAWS, BAND
30" LAIDLAW, Metal Cutting hydraulic feed
30" TANNEWITZ, 3 hp., 440 V.
42" TANNEWITZ, 5 hp., 220-440 V.

SAWS, CUTOFF
DELTA Abrasive cutoff

SCALE
FAIRBANKS PRINTOMATIC 6250#

SCREENS
3' x 8' SIMPLICITY

SHAKEOUTS
3' x 5' SIMPLICITY
5' x 6' SIMPLICITY
5' x 10' LINK BELT

SPRUE CUTTERS
2—PERKINS #53 1¼" stroke
1—MILWAUKEE #85 TON

TESTING EQUIPMENT
ARLIN Automatic Rockwell, continuous type
COLEMAN 55 Spectrophotometer
BALDWIN SOUTHWARK 20,000 Tensile Tester w/load indicator and recorder
TYLER ROTAP Testing Sieve w/screens

TUMBLING BARRELS
2—ROYERSFORD, 42" x 72", chain drive, late
WHITING 60" x 72" 20 hp. drive
SLY 42" x 42" x 64" 10 hp.

WHEELABRATORS
2—42" x 48" AMERICAN Skip Loader
1—27" x 36" AMERICAN Skip Loader

WOODWORKING—PATTERNSHOP
GARDNER 30" DISC and Spindle Sander
JONES SUPERIOR 48" Double Disc.
OLIVER 72DR Router or borer
PORTER 24" Facing Planer
BOICE CRANE 12" Planer
HESTON ANDERSON Swing Saw #5
DELTA 10" UNISAW
NORTHFIELD #4 Tilting Arbor Saw

EKSTROM CARLSON #540 Universal Router Mill Drill

WIRE STRAIGHTENERS
AMERICAN type H rod ⅝"-⅝" cap.
2—#2A CLIMAX ¼"

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WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR & ELECTRIC HOISTS

15—DETROIT Air Hoists, 1, 1½, 5 ton cap.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.
85—INGERSOLL RAND Air Motor Type. Sizes RC-5, A, B, C, ¼, ½, 1 ton.
1—SHAW BOX 2 ton load lifter.
2—YALE ½ ton.

BUCKET ELEVATORS

12—LINK BELT & JEFFREY, 30, 40, 50, 60 ft. cc, 10 x 7, 12 x 7, 14 x 7 buckets.

CUT-OFF MACHINES

2—AMERICAN H-Rod Straighteners.
1—TABOR B7½ AC, 14" wheel, 7½ HP.
3—TESSEMER H & L Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLER Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model 8B-11 & 8B-13, 8B-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. cores.
3—MILWAUKEE #3A Bench Type.
1—SPO Model SC-10-DM Shell Core Blower.
1—SAN-BLOW. Model CB-40-B. 40# Cores.
1—SAN BLO Model 40P-1, w/pulsator.

CORE OVENS

1—CARL MAYER 2-Compartment, oil fired, I.D. 7' W x 14' deep x 8' H each.
1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
1—THERMONIC Model M800A Dielectric. Cap. 900#s per hour.
1—YOUNG BROS. 6' x 6' x 9' double door, rack type, gas fired.

CUPOLA BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—ROOTS 7,000 CFM, 50 HP motor.
1—ROOTS CONNERSVILLE Type RCS Size 20 x 60 w/75 HP motor.
1—MODERN No. 3½ Cupola.
1—CUPOLA Bondactor, style 1205-L.
1—WHITING No. 6 Cupola.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—TOCCO 20 KW Induction Unit, 9600 cycles.
3—AJAX No. 100 & 300 Furnaces Only.
1—DETROIT Size CM — 4000# Cold Charge, 8000# Molten Metal, w/1000 KVA transformer.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP electric Tilting. Sizes 150, 400, 600, 1000, 1700, 2000 & 2400#, aluminum capacities. Gas or Oil Fired.
29—LINDBERG FISHER & CAMPBELL, HAUSFELD Stationary. Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired.
1—STROMAN Model JC Cradle Type Hydraulic tilt, 2000# capacity. Iron.
1—STROMAN, Model "U," 600# Reverberatory Hand Tilt.

HEAT TREAT FURNACES

1—DESPATCH Model DT-26, 38" diameter x 26" height, gas fired recirculating, 1250°, pit type.
1—SURFACE COMBUSTION, 54" x 96", box-type, gas fired, 1850° F.

GRINDERS

Swing Frame

1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
2—U. S. ELEC. Model 24, wheel 24" x 3".
1—MUMMERT-DIXON #2420, wheel 24" x 3".

Snagging

2—U. S. #64, 20" x 3", 7½ HP. 4 speed.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S #65, 30" x 3", 30 HP, 4 speed.
U. S. No. 62VS, 24" wheel, 2-7½ HP motor, variable speed.

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder. 18" dia. Wheel.

Horizontal Disc

GARDNER No. 124—53" wheel. 20 HP
GARDNER No. 179, 70" dia. wheel, 40 HP.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
12—MODERN Model F-9 and FA-9 Pouring Devices, with ladles 400 to 800 lbs.
37—MODERN & WHITING Lip Pour, Enclosed Gear. 1200, 1600, 2000, 4000, 6000, 7000, 8000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles, 2 & 3 ton capacities. Electric & Manual Tilting.

MOLDING MACHINES

Jolt Squeezers

37—OSBORN, SPO, MILWAUKEE, Portable & Stationary, 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.

Plain Jolt

1—HERMAN 8' x 12' table, 32,000# cap.
1—J&J 50 x 72 Table—5000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30.
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Sizes 20" x 8", 24" x 10".
1—INTERNATIONAL RES Size 15" x 8".
2—J & J #612, 24" x 30" Table.
4—J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" draw, 750 lbs Cap.
2—OSBORN 643 Table 35 x 50—2000#
1—SPO #413D, 24" x 25" Table.
1—SPO Model 9336, table size 22" x 28".
1—SPO Model 508, table size 28" x 30".
1—SPO 506—24" x 30" Table 10" Draw.
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 32" Table, 10" Draw.

Jolt Pin Lift

3—INTERNATIONAL JDP 1600 X 10" draw, 36" x 36" table.
2—OSBORN #559, 25" x 30" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—SPO #3102—42" x 50" Table.

Pin Lift

9—INTERNATIONAL & B & P Speed Draw. Used with Sand Slinger. Cap. 600 to 2000 lbs., up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE #125, 21" x 27" Table.
MILWAUKEE No. 165, 24" x 30" table, 16" sq. cyl.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
4—INTERNATIONAL PKL, 17" x 26".
1—INTERNATIONAL PK-20, Size 20" x 8".
2—OSBORN 716 PJ-22" x 34" Table—16" dia. sq. cyl.

CONVEYORS

Steel Apron

9—JEFFREY & LINK BELT 24", 30", 36", widths. Lengths built to your specifications, with reducers & motors.

Oscillating & Vibrating

1—LINK BELT 48" x 154', 20 HP Motor.
7—JEFFREY TAYLOR, No. 5 Vibrating Feeders 24" wide x 7'.
LINK BELT "FLEXMOUNT"
1—8" W x 50' L x 4" deep pan
1—12" W x 21' L x 4" deep pan
1—12" W x 26' L x 4" deep pan
1—18" W x 15' L x 4" deep pan

Roller

2500' MATHEWS 6", 12", 18" & 20" wide. 2 A/16" dia. roller, 1 1/16" hex shaft centers, 4" channel.
500—MATHEWS 12" & 36" wide, 3½" dia. 1" hex shaft on 6' centers, 6" channel.

Mold

3—LINK BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & Ploughs.

MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK BELT Storage Bins. 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.

SAND MULLERS

1—B & P #40 Speed Muller, 6 cu. ft.
1—B & P #50, SpeedMullers, 9 cu ft.
1—B & P #60, Speed Muller, 12 cu. ft.
2—B & P #70, Speed Mullers, 18 cu. ft.
2—CLEARFIELD No. 610 w/skip hoist loaders. 10 to 14 cu. ft. batch.
CLEARFIELD #404, 4 cu. ft. cap, 5 HP.
1—DRAVO-DOYLE 6 cu. ft. cap. Port.
1—LINK BELT 48" x 8' Paddle Type.
1—PEKAY No. 160-1-24 Mixer Muller, single stage for 24" belt, 230 TPH
1—SIMPSON No. 1H Style UD—500#
1—SIMPSON #1½, Style UD, 700 lb., w/loader.
2—SIMPSON #2, Style C, 1500# w/loader.
2—SIMPSON #2, Style UD, 1500# w/loader.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
SIMPSON "PORTO-MULLER", 3 cu. ft. cap.
2—Mixer Muller, 6 cu. ft. paddle type.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—AMERICAN "Sand Master," 102"/70" cutting blade—1952.
1—MOULDERS' FRIEND 60" Brush.

SANDSLINGERS

1—B & P Motive Jr., 300 cu. ft. tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
4—B & P 8 ton plate feeders.
2—B & P 35 ton capacity plate feeders.

SHAKEOUTS & SCREENS

2—LINK BELT 5' x 10', 6 ton cap.
1—SIMPLICITY 4' x 10' Model D.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, Single deck sifter screen, 10 HP motors.
2—ROBBINS 3' x 4' JF6—2000#
2—ROBBINS 3' x 5' JF6—2000#
1—ROBBINS 4' x 6' JF9—8000#
1—ROBBINS 4' x 8' JF9—10,000#
1—ROBBINS 6' x 10' JF11—20,000#
1—ROBBINS 8' x 10' JF11—30,000#
1—SIMPLICITY 4' x 6' Model B.

SAND BLAST EQUIPMENT

1—AMERICAN 36" x 42", w/skip Hoist.
2—AMERICAN 48" x 42", w/skip Hoist.
1—AMERICAN 27" x 36" w/skip hoist.
1—AMERICAN 48" x 48".
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7-14" tables.
1—AMERICAN No. 2A multi-tablast.
1—AMERICAN 20" x 27" Rubber Belt Tumblast.
1—PANGBORN #45, type MT Sand Blast Room 10' L x 8' W x 6' H.
1—PANGBORN No. 53 type EN-2 blast cabinet with dust collector.
1—PANGBORN Model 6-LF, 6' diameter plain table with dust collector.
1—PANGBORN #44NF Shot Blast Room 10' x 9' x 9'.

TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes: 30" x 48", 24" x 48", 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

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AIR COMPRESSORS
COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

BLOWERS
25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure & Cent, Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS
1—AMERICAN 20" x 27" WHEELABRATOR, Rubber Belt
1—AMERICAN 27" x 36" WHEELABRATOR TUMBLAST
1—AMERICAN 36" x 42" WHEELABRATOR TUMBLAST
1—AMERICAN 48" x 42" WHEELABRATOR TUMBLAST, w/loader
1—AMERICAN 36", Continuous WHEELABRATOR, side discharge, two head, Serial #A95643. New 1953. Used 2 months
1—PANGBORN TABLAST, 8' Table
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round
4—SLY, 48" x 36" Round, complete

CONVEYORS
1—JEFFREY, 3 compartment, ingot mold
1—LINK BELT, vibrating, 80' x 24", w/exhaust hood
1—LINK BELT, CAR type mold, 114 cars, 403' track, car size 18" x 42"
2—LINK BELT, 30" Steel Apron Conveyors. 100' Centers
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

CORE BLOWERS
10—DEMMLER #1, #2, #2A, #2K, #3K, #4E
3—INTERNATIONAL SB-13
3—OSBORN #91, #192, #91-10
1—RANDALL MODEL "A", Bench Type
1—TACCONE #4D, 10" Draw Stroke Cyl.

CUPOLAS
1—SKIP CHARGER for #9 Cupola with scale and buckets
1—WHITING Skip Charger for #5 Cupola
2—WHITING #7, 7 ton cap., New

DUST COLLECTORS
1—AMERICAN WHEELABRATOR, Model #115KD, 20' L x 9' W x 9' H
10—ROTOCLONE #12, Type N, #14D, #16W, #20D, #24W, #30W

FURNACES—DIRECT ARC MELTING
1—250 Lb. LECTROMELT, Side Charge
1—500# LECTROMELT
1—3000 #/hr LECTROMELT
1—3000# HEROULT
1—3 Ton SWINDELL Hyd. Top Charge, 3000 KVA Transformer, Latest Type

FURNACES—INDIRECT ARC
1—350# DETROIT LFA
1—750# DETROIT LFY, Conical Shell
1—1000# DETROIT AA, 300 KVA
1—3000# DETROIT C, 500 KVA

FURNACES—INDUCTION MELTING
1—3 KW, AJAX, Lab type
1—20KW, AJAX SPARK GAP, High Freq.
1—100 KW Water Cooled, 300# Steel—NEVER USED
1—333 KW AJAX 1000#

. . . MUST SELL AT ONCE
3 Ton Top Charge
SWINDELL ARC FURNACE
Unit is in Excellent Condition, Dismantled, ready for Immediate Delivery.
IMMEDIATE DELIVERY

FURNACES—GAS & OIL
1—FISHER MNP, Gas Tilting, 1700#
1—400# FISHER MNP, Gas Fired
1—400# FISHER, Oil, Stationary
1—250# FISHER, Oil, Tilting
3—Stationary, Gas, 250# to 1000#
1—HAUSFELD, Tilting, 1200# capacity
1—STROMAN, Gas, 1000# cap. Alum., auto control hyd. tilt.
1—STROMAN, Gas, 600 lb., "U" Type

FURNACES—HEAT TREAT
1—2' x 3' x 6', gas fired, 1800° F.
1—4' x 4' x 10' Gas Fired Annealing
1—20" x 24" deep, L&N Homocarb electric
1—20" x 36" L&N Draw electric

GRINDERS
1—5 HP CINCINNATI, 2/60/110
1—5 HP GARDNER, 12" x 2½" wheels
1—7½ HP U. S. 2300-8400 RPM, 14" x 2" wheels
1—7½ HP U. S. 3/60/220, 20" wheels
1—7½ HP U. S. Model 66, 14" x 3" wheels
1—10 HP U. S. Model 65, 20" x 3" wheels
3—10 or 15 HP SWING FRAME, 22" wheels

MOLDING MACHINES
Jolt Rollover Pattern Draw
2—J & J #1020, 50" x 60" Table, 3000#
1—J & J #918, 44 x 54 Table, 20" draw
1—J & J #815, 30" x 40", 15" draw, 1200# jolt
2—HERMAN 10,000#, 48" x 109" table
1—HERMAN 6000#, 50" x 72"
1—HERMAN 3000#, 30" x 66" Table
2—HERMAN 1500#
1—HERMAN 750#, 30" x 36"
2—INTERNATIONAL, 13" x 17" table, 6" draw
1—OSBORN #602, 36" x 26", 900#
1—OSBORN #405, 3000#, flask size 64" x 50", 18" draw
1—OSBORN #42, 15" x 20", hand draw
3—Tabor 40" x 60", 1500 & 3000# capacity
1—TABOR, 30" x 40" w/air clamps, 1000#
1—TABOR 22" x 42", pattern draw, shockless, portable
1—TABOR, 20" x 30" w/air clamps, 1000#
2—TABOR, 14" x 16" Rockover
Plain Jolt
5—DAVENPORT, table sizes 24" x 27", 30" x 30", 1200# to 1800#
1—SPO #5SP, 18" x 28" table, 800#
Jolt Pin Lift
1—HERMAN #4317, 22" x 30" table
1—J & J #681-C, 30" x 25" table, 600#
1—MILWAUKEE #1536, 32" x 38", 1500#
1—OSBORN #559, 25" x 30" table, 6" draw, 1200#
3—SPO #305, #307, 750 lb., 1500 lb.
1—TABOR, 17" x 20" table, portable
1—TABOR, 20" x 20" table, hand strip
1—TABOR, 20" x 24" table, 600#
Jolt Squeeze Pin Lift
2—INTERNATIONAL, PKL, 18" x 24" table, 12" sq.
1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200#
2—MILWAUKEE #163, 15" x 24" table, 11" sq.
2—MILWAUKEE #165, 24" x 30" table, 16" squeeze
5—OSBORN #712J, #712PJ, 18" x 28" table, 12" sq.
1—OSBORN #716PJ, 22" x 34" table, 1250#
5—SPO #2114P, 21" x 27" table, 600#
2—SPO #2136G, 21" x 30" table, 800#
Jolt Squeezers
4—INTERNATIONAL #10 LJS, 17" x 20"
1—MILWAUKEE #104-SJS, 17" x 21", port.
1—NICHOLS #12 F-P, portable, 600#
28—OSBORN #275J, #275PJ, 17" x 20" tables, 10" sq., 400#
10—SPO #110J, 17" x 20" table, port.
8—TABOR, 3" jolt, 17" x 20"

MATERIAL HANDLING
1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—CLARK, Fork Lift, Gas, 3,000 lb., capacity. Solid Tire
1—HOUGH PAYLOADER, Model HA, 1000# cap.

MULLERS AND MIXERS
1—B & P #30 Speedmullor, 3 cu. ft. batch
1—B&P #60 Speedmullor, 10 cu. ft. batch
1—B & P #70 Speedmullor, 15 cu. ft. batch with cooling and skip loader.
1—B & P, Conventional, SIMPSON type, 87¼" Dia., arranged for cooling
1—CLEARFIELD #404, 4' Dia., 4 cu. ft. batch
1—MULLER Plaster & Mortar Mixer, 3 cu. ft. batch, Pneumatic Tires
2—SIMPSON #0, U.D. 3' Dia., never used
1—SIMPSON #1½ Style U.D., 4'6" Dia., 6 cu. ft. batch, with loader
1—SIMPSON #2, 6' Dia., 14 cu. ft. batch, Open Gear
1—SIMPSON #3, 8' Dia. Unit Drive, with loader 20-25 cu. ft. batch

LADLES AND POURING DEVICES
Bottom Pour
2—MODERN Crane Type, 55" H x 50" top
1—MODERN Crane Type, 60" H x 50" top
Lip Pour
1—WHITING 42" x 42" top dia., geared
Cylindrical
8—WHITING, 26" L x 25" dia., 1100# iron
7—WHITING 19" L x 25" dia., 600# iron
3—WHITING, 38" L x 28" dia., 2200# iron
Pouring Devices
7—WHITING, 850# to 2000# gross cap.

OVENS
1—ALLIS CHALMERS Dielectric Core Oven, Type 15 CH, 650# cores/hr.
1—COLEMAN, Gas, 2 Comp. and 5 drawers, OD. 22" x 12' x 10'
2—GENRICH, Elec., 3 drawer, preheating, auto-control, 9' H x 8' W x 6'7" L
1—KOCHS BROS. Electric, 36 x 40" x 64" inside
1—PORBECK, Oil, 5 drawers, OD 98" w x 106" h x 70" deep
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½' x 14' x 7'

SAND CONDITIONING
3—B & P Screenarator, Model "S" & "M"
1—JEFFREY Sanditioner, Portable, 10-15 tons/hour, 2 H.P. Motor
1—NATIONAL ENGINEERING SAND-PREPARATOR Unit w/permanent magnet pulley
2—ROYER, NC-2, 10-15 tons/hr., 1½ HP Motor
1—ROYER PREPARATOR, Comb. Model NDC, 25 Ton/hr. Scrap removal, 8' x 8' hopper
2—ROYER, NDP 15-25 tons/hr., 2 HP
1—ROYER, NRS, 40-60 tons/hr., 5 HP

SAND CUTTERS
1—AMERICAN, 15 HP, 96/78 Reel
1—AMERICAN, 10 HP, 48" Reel
1—B&P Stationary, 2 Speed, 19" head, 4" tip
1—B&P Stationary, Single Speed, plate feeder
1—MOULDERS' FRIEND, 61" brush, reversing control, Like New

SAND SLINGERS
1—B&P Tractor Type, 19" head
1—B&P Tractor Type, 16" head

SHAKEOUTS AND SCREENS
1—HEWITT ROBINS, Vibrex screen, 3' x 8'
3—SIMPLICITY, 3 x 8, 5 x 8, 8 x 10

MISCELLANEOUS
1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5
1—PATTERSON-KELLEY Twin Shell Dry Blender, 3 cu. ft. capacity
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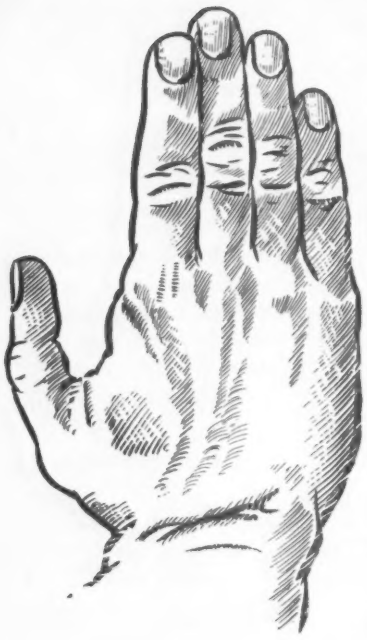

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Oliver makes a wide line of woodworking machines for pattern shops including Pattern Lathes and Pattern Millers. Write for details.

OLIVER SINCE 1890

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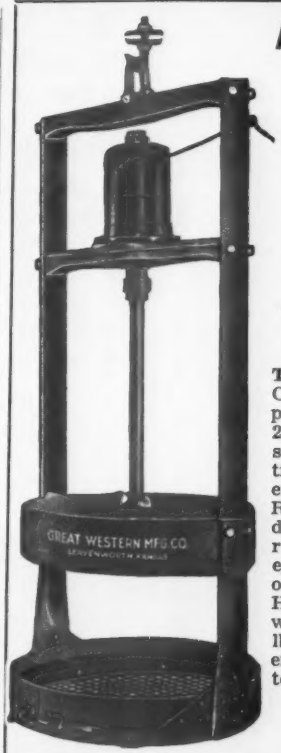

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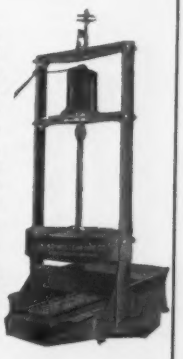

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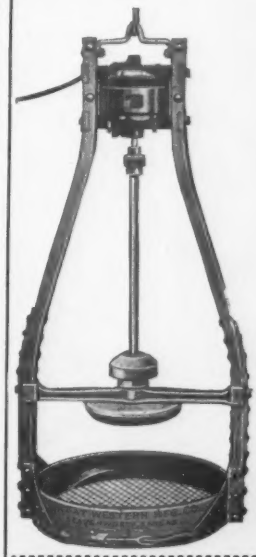

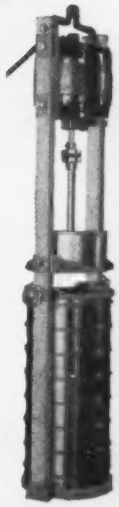

TYPE "HL". Price $285.00 complete, less sieves. Laboratory model especially designed for laboratory sand control, fitted with 1/6 H.P. enclosed motor.

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Circle 732 on Page 51

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- ***Savings from depreciation policies . . .***
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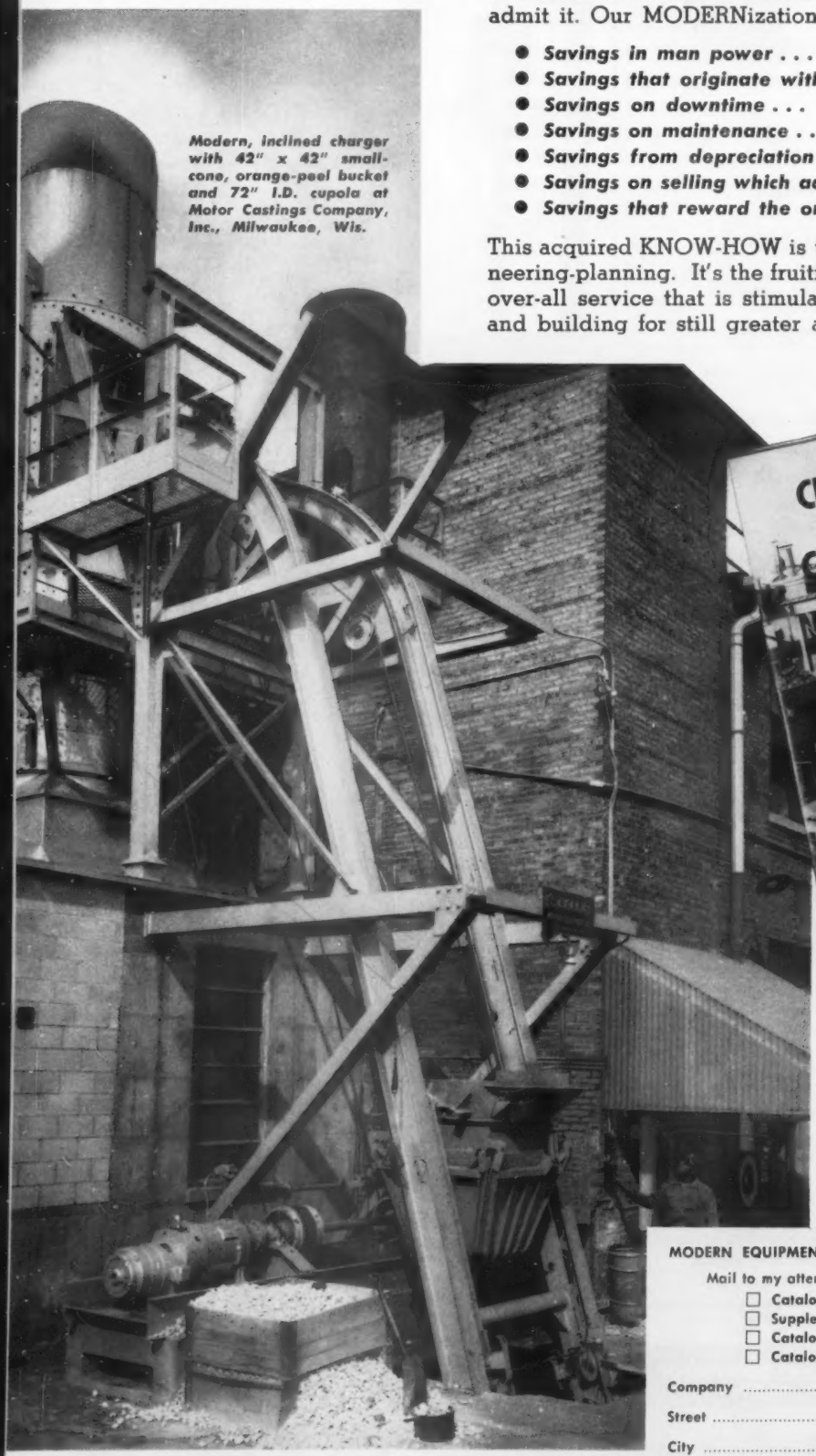
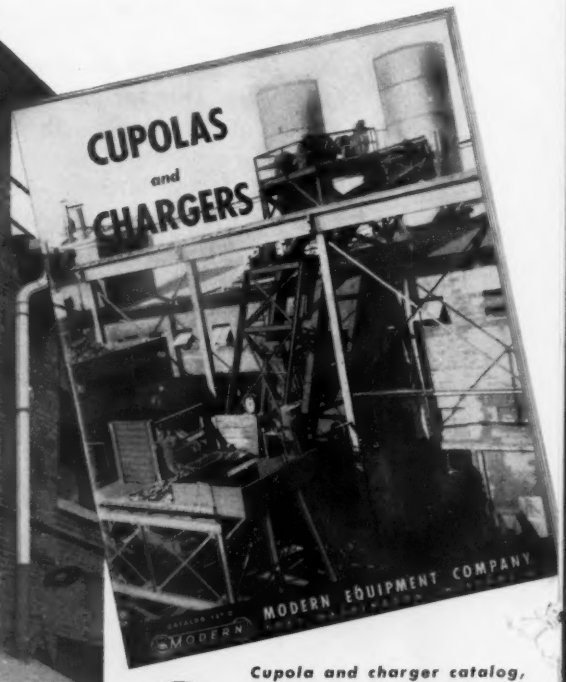


Modern, inclined charger with 42" x 42" small-cone, orange-peel bucket and 72" I.D. cupola at Motor Castings Company, Inc., Milwaukee, Wis.



Cupola and charger catalog, with water-cooled supplement, will be mailed on your request.

MEMBER FEMA

MODERN

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MODERN EQUIPMENT COMPANY, Dept. F-7, Port Washington, Wisconsin

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- ☐ Supplement 149-A on water-cooled cupolas . . .
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Circle 733 on Page 51

SUPER RESULTS IN YOUR FOUNDRY

- A powdered zircon core and mold coating.
- Has a fusion point of over 4000° Fahrenheit.
- Withstands the highest temperatures.
- Its white color means easy visual checking of coating thickness and ease in setting cores in molds.
- Easier casting shake-out because Super-Z is not readily "wet" by molten metal.
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- 100% solids — you are not buying water.
- At normal consistencies it stays in suspension indefinitely.

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EVERYTHING FOR A FOUNDRY

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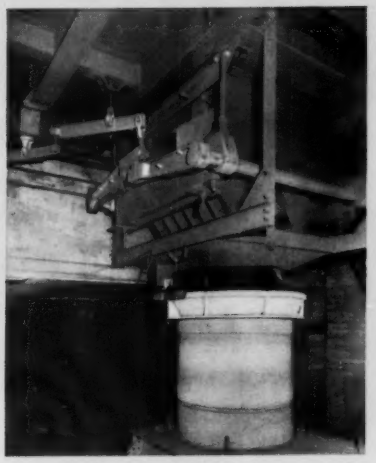
View of Metal Platform and Coke and Stone Bin Showing Recording Scale.



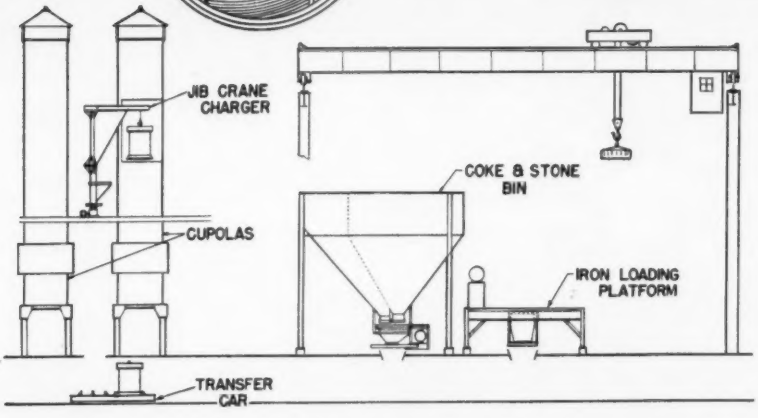
Bucket in Metal Loading Position in Tunnel.

Grindle No-Sway Jib Crane Moving Bucket into Cupola.

BARTLETT-SNOW
CLEVELAND 5, OHIO

Grindle DIVISION

EFFICIENT COMPACT INEXPENSIVE *Charging System* for a medium size foundry



Typical Arrangement of a Grindle Charging System for Medium Size Foundry when Yard Area is Limited.

The arrangement shown above — for charging two cupolas when yard space is limited — is only one of the many Bartlett-Snow Grindle charging systems designed for efficiency and economy; — ruggedly built for continuous, trouble-free operation; — and proven in service.

Use of a shallow tunnel permits the coke and stone bin, and the iron loading platform to be mounted close to the ground saving head room, and lowering the crane run-way. The jib crane is fitted with Grindle automatic speed control that avoids bucket sway and prevents damage to the cupola lining.

Our trained, experienced engineers will gladly study your conditions and suggest ways in which you, too, can secure the utmost of dependable, efficient operation, — at lowest investment in new equipment! Check with Bartlett-Snow on your next job!

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Designers, Engineers, Fabricators and Erectors of Foundry Equipment

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